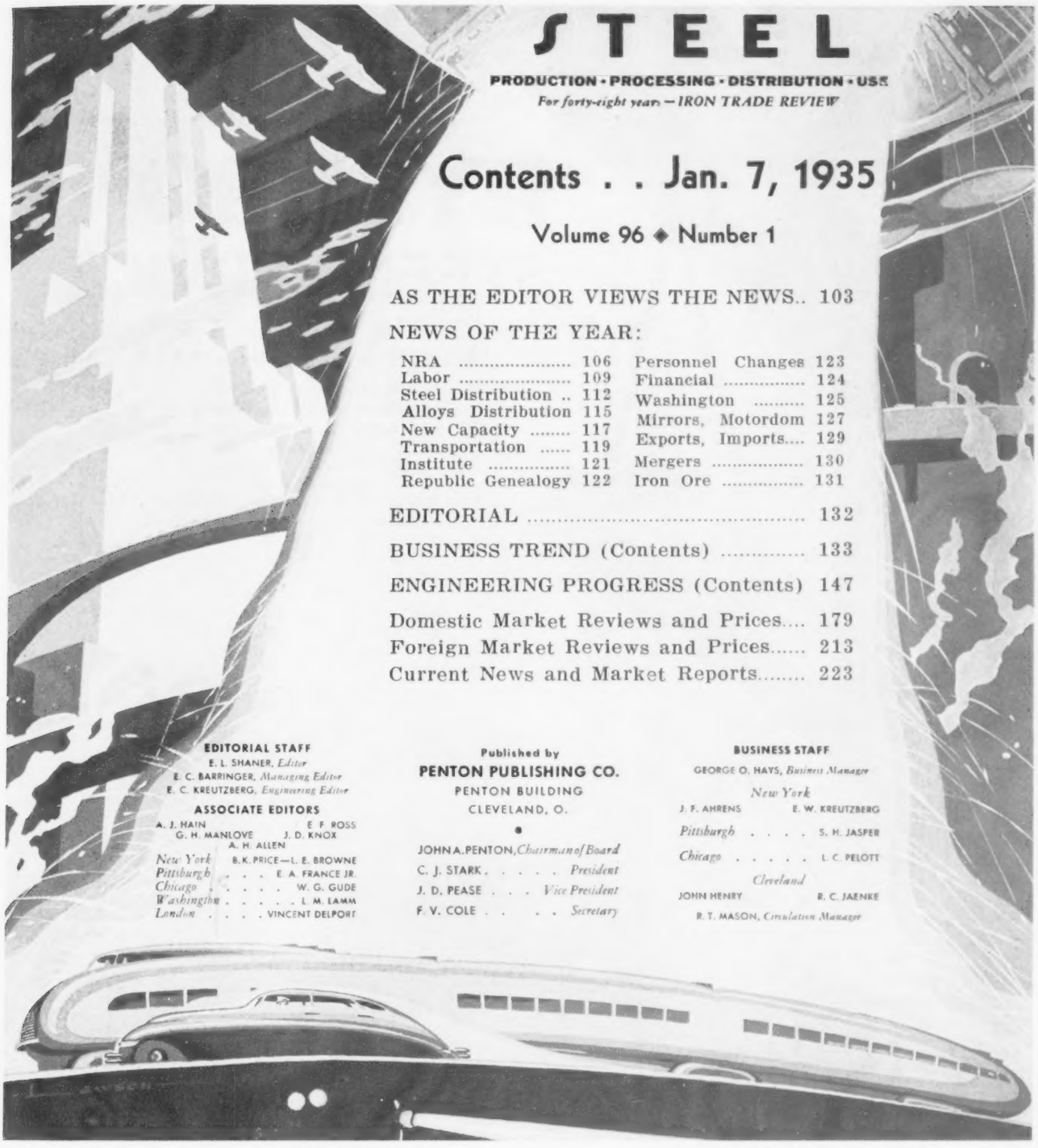

STEEL

PRODUCTION · PROCESSING · DISTRIBUTION · USE

For forty-eight years — IRON TRADE REVIEW

Contents . . Jan. 7, 1935

Volume 96 ◆ Number 1

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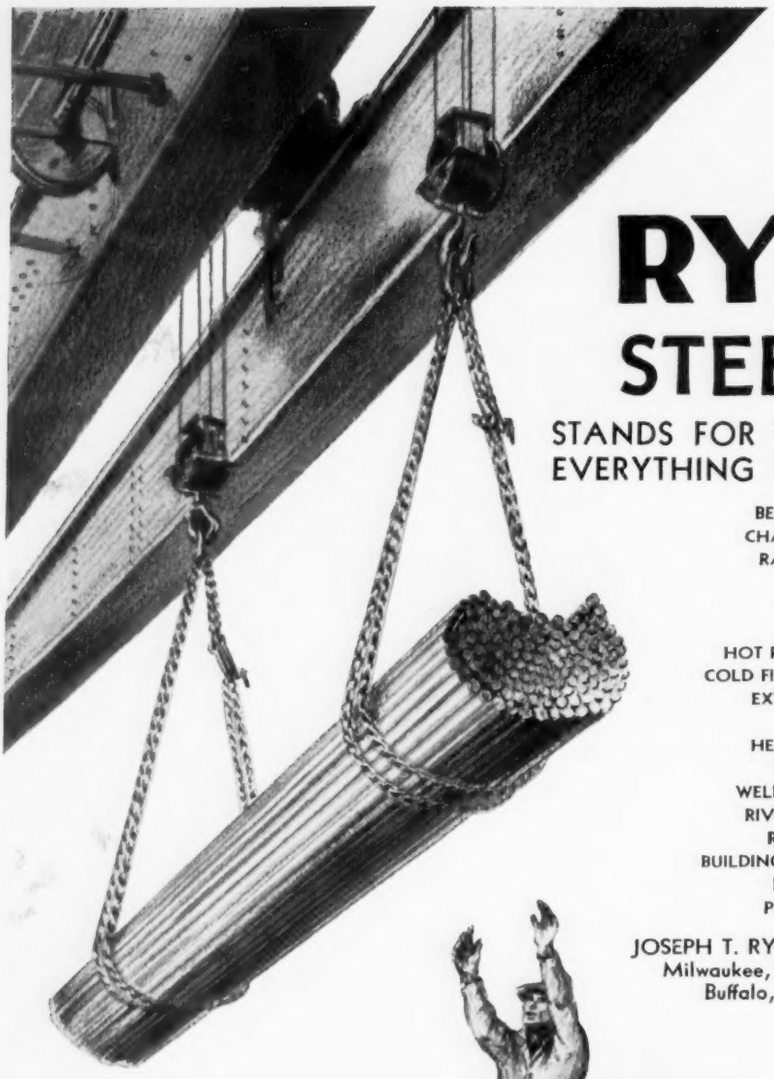

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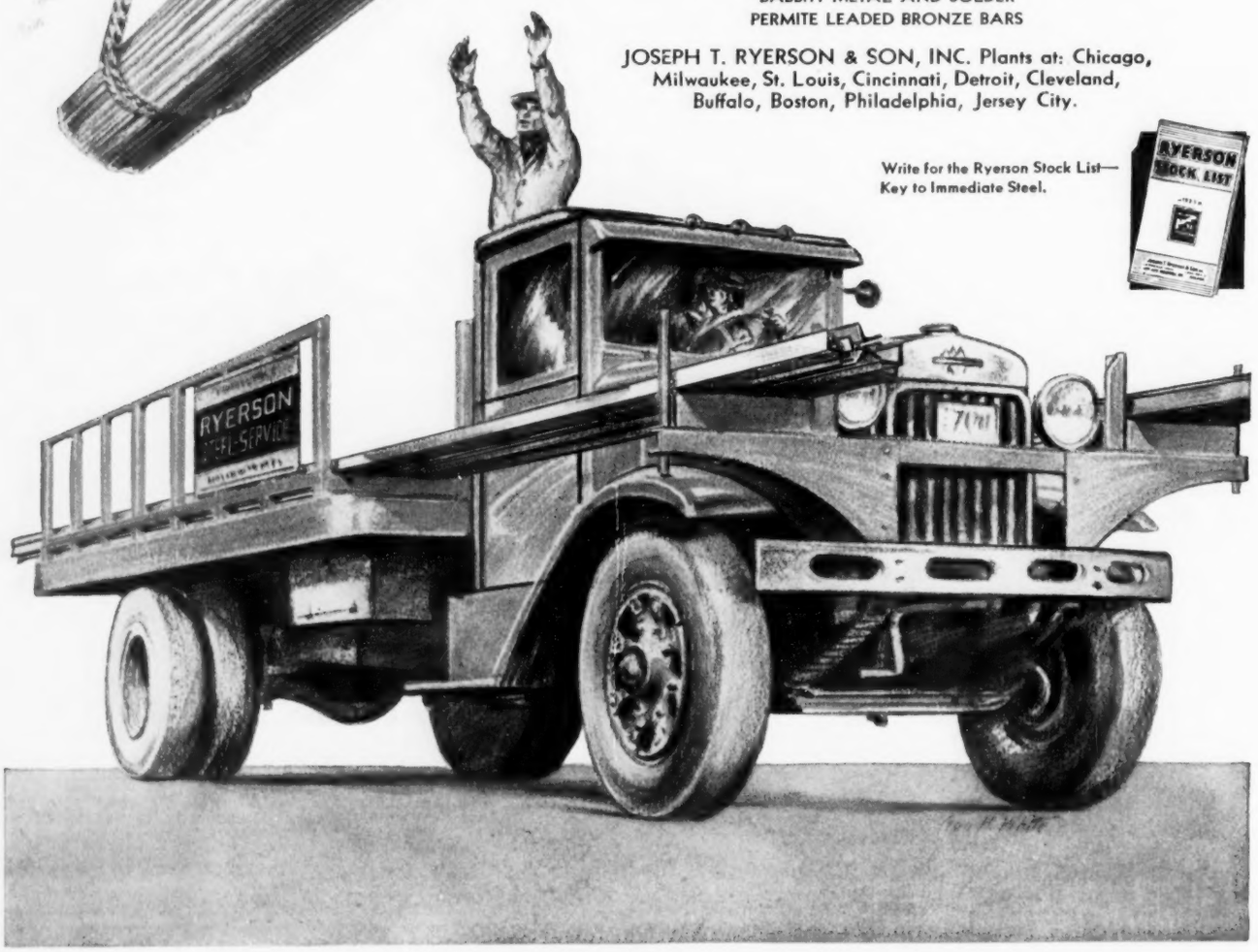

STEEL
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As the Editor Views the News

WHEN the ledger clerk of history strikes the final balance for 1934, the books will show that the government's attempt to win recovery through a planned economy fell far short of the goal that was claimed for it. When all of the credits and debits are in, it will be found necessary to write down the assets from their face value of 1934 and to enter the liabilities at figures considerably above present estimates.

• • •

From the standpoint of the iron, steel and metalworking industries, the methods employed by the government administration in its three-part program of relief, reform and recovery appeared to produce certain benefits. It is significant that the companies operating under the steel code, in the first year of its administration, paid out $95,000,000 additional in compensation for labor. The fact that the government, interceding for the railroads, enabled the steel industry to roll a much larger tonnage of rails in 1934 than in 1933 (p. 112) may be credited as a tangible, short-term accomplishment of the new deal.

Benefits of New Deal

Activities of the PWA, RFC, CCC and other agencies, which stimulated the construction of many public works projects and thus swelled the output of shapes, plates, bars, etc. unquestionably contributed to an improved business year for producers of material, fabricators and builders of a wide variety of equipment and machinery.

• • •

Granting that the new deal should be credited with much of the betterment of 1934 over 1933 in the iron, steel and metalworking industry, what does the record show?

Production of steel ingots and castings in the United States in 1934 increased 12 per cent over that of 1933. Pig iron output was up 21 per cent. For the entire world, the output of steel ingots and castings totaled 79,778,000 tons, a gain of 26 per cent.

The showing of the United States in comparison to that of other countries (p. 141), while distasteful to certain proponents of the new deal, nevertheless is enlightening:

GAINS IN PRODUCTION, 1934 OVER 1933

	Steel ingots and castings (Per cent)	Pig iron (Per cent)
United States	12	21
All of Europe	25	29
Germany	58	68
Russia	37	43
Great Britain	28	45
Canada	90	60
Entire world	26	26

On the basis of STEEL's compilation of world production, 1934 was a year of marked recovery on all continents in which industry is an important factor. That the improvement was due in a large measure to natural forces is proved by the uniformity of the upward trend in widely separated states and by the manifestation of marked recovery in nations where no unusual efforts to promote business improvement through artificial stimulants were employed.

Recovery Is World Wide

This prompts the suggestion that the lag of the United States behind countries unencumbered to like extent by reform and relief burdens is amply justified by the social benefits which the new deal tenders the forgotten man.

The answer to this is that nothing can take the place of industrial activity and its attendant profit as an effective foundation for social reform. To exact too much from industry when it is sorely tried by the rigors of depression is to exhaust the very source of strength for relief and reform. In this respect, the performance of the new deal in 1934 has managed to make a fair short-term showing at the expense of long-term recovery. The apparent benefits of the moment will prove to be embarrassing handicaps in the long pull.

• • •

LABOR policies under the new deal furnish an apt illustration of the manner in which apparent, immediate benefits obscure the unsavory details of the final day of reckoning. The experience of industry in 1934 has proved that three serious mistakes have been made in connection with labor. The first, and the one responsible for endless un-

necessary conflict throughout the year, was the notorious Section 7a of NIRA. Failure to write it properly in the first place; failure to interpret it uniformly, consistently and intelligently; and inability to win respect for it from employes, employers or the public has led to unlimited abuses. While serving no useful purpose, it has encouraged racketeers, deprived hundreds of thousands of willing employes of many hours of available work, ruined scores of business enterprises, caused unnecessary trouble for employers, and discriminated against the interests of more than 30,000,000 wage earners who have no use for professional labor unions or their activities.

The second mistake, which was accentuated in 1934, was the philosophy of the new deal which calls for high unit wage rates. The experience of hourly rates pegged at fantastic levels was so disastrous in CWA last winter that the administration will not repeat the mistake. Yet the same error is being committed all along the line in industry. The only wage policy which in the long run will benefit the honest employe is the one which is responsive to the consumer demand. Time will show that this point is largely responsible for the difference in the extent of recovery in the United States and in other industrial nations. Sooner or later A. F. of L., the government administration, and all others interested in the welfare of the employe will realize that high unit wages do not mean satisfactory real income.

Pegged Wages a Mistake

• • •

CONGRESS, responsible for the third mistake—namely blanket maximum hour legislation—threatens to repeat the error in the present session. The 40-hour week, perhaps partly excusable as a type of purely emergency proposition, and doubtless a desirable ruling in certain industries, is untenable as an ironclad fixture for all establishments. To adopt a 30-hour week, following the obvious failure of the 40-hour week to accomplish what was claimed for it, is to compound a demonstrated error.

• • •

The labor relations mess, coupled with the evil effects of blanket minimum wage and maximum hour legislation, provides a good illustration of the disillusionment which was visited upon the heads of new dealers in 1934. It is fair to state that the key men in Washington are more clearly aware of the shortcomings of the new deal than is the public at large. When the President delivered his Green Bay address he still was under the impression that everything was progressing according to plan. His assurance on this score permitted him to indulge in the luxury of a sharp "dig" at "Tories" who question the efficacy of the new deal. He went so far as to pillory those who asked for the removal or clarification of uncertainties.

• • •

FAR from pacifying industry, the Green Bay speech intensified the protests from many responsible executives. Shortly after the President returned to Washington, he appeared to sense the gravity of the situation. He was shown plainly that the country, in its recession from the peak activity of May (p. 134), had actually lost more ground than it had gained in the 1933-1934 drive for recovery. The almost unprecedented abruptness of the collapse of July, the continued severity of decline in August and the final low point touched in September—these tangible evidences of the effect of intangible, uncertain government policies—were more effective than protests in persuading the administration that it was time to call a halt on the Green Bay type of tactics.

Fear that the new deal would break down in the face of continued business improvement in Canada and abroad gripped the members of the Washington administration. Quickly they countered with a policy of conciliation toward finance and industry. Employing the full facilities of propaganda, they launched a campaign of peace with business interests. The olive branch was waved successfully at the annual meeting of bankers. In turn it was extended to other groups. The crack-down tactics of NRA were put on a shelf. Secretary Roper and Co-ordinator Richberg became emissaries of peace and good will. In turn, finance and industry softened the tone of their protests. All factions displayed a willingness to quit sniping, and to attempt to get together on a common basis for another drive for recovery.

• • •

Out of this truce developed a change in the philosophy of industrial executives which will guide their behavior as long as the federal government remains as a dominant figure in the affairs of private business enterprise. Their faith in the integrity of political supervision of industry has been shattered. Their confidence in the ability of government to understand the problems of industry and to administer to the needs of private enterprise efficiently and justly has been destroyed. Their belief that the public, the members of congress, and the federal administration can be sane and sensible in time of

Industry Disillusioned

emergency has been strained to the limit. As a result, they have accepted—reluctantly and after valiant protest—the idea that a certain amount of demagoguery, a hysteria among public officials and the populace, and an avalanche of "wild" legislation is concomitant to this period (p. 132) of national recovery. As a consequence, industry, while as alert as ever to the threat of ill-advised legislation and executive action, is better prepared to play the game with the cards as dealt.

• • •

1935 Is Off To Good Start

Knowing what to expect from government and more determined to win recovery in spite of artificial handicaps, industry should make more of its opportunities in 1935 than it has in the recent past. The new year starts off auspiciously under the momentum of a delayed upturn (p. 133), which has been gaining strength since last September. The present expansion of industrial activity has the earmarks of a surge of natural economic recovery, rather than of an artificially stimulated improvement. In this respect, it differs from the active period of January to June, 1934, which was influenced to a considerable extent by the expectation of higher prices (p. 179) and the fear of a strike—factors directly traceable to features of NRA.

• • •

ONSIDERING the experience of 1934, the best thing that could happen to the cause of national recovery would be the rapid transfer of activity of all kinds from government to private sponsorship. If the upward movement now underway can be permitted to progress naturally, with a minimum of unnecessary restraint, it is possible and quite probable that business will do more in providing re-employment than was expected of public works and other projects undertaken by the federal government.

In saying this, one does not deprecate the influence of government-created work in 1934. The supporting hand of Washington shows heavily in all of the statistical records for the year. Consumption of finished rolled steel, for instance, shifted noticeably, due to federal activities. The railroads, by virtue of purchases made possible by government funds, leaped from fourth rank in the consumption of steel (p. 112) to second place. Federal projects also contributed to increased consumption (p. 114) of shapes, plates, pipe and tubing and several other products. The only items of finished rolled steel which suffered recessions from 1933 levels were tin plate and wire products. As a result of the decline in tin plate, the container group dropped from second to fourth place in the consumption of steel. The automobile industry, as was to be expected from its achievement in producing 1,000,000 more cars in 1934 than in 1933 (p. 127), retained its hold on first place in steel consumption.

Increased demand for its products enabled the steel industry to reduce its deficit from $36,000,000 in 1933 (p. 130) to about $22,500,000 in 1934. Earnings fluctuated widely during the year. A profit of $2.58 per ton of ingots produced in the second quarter (p. 180), was more than wiped out by a loss of $5.61 per ton in the third quarter.

• • •

USTY PAGES from the book of time sometimes remind us that the problems we consider new today also vexed our predecessors in previous generations. The genealogy (p. 122), showing the steps in the growth of a large steel corporation brings to mind the picture of a steel industry in the nineties composed of hundreds of small independent units, widely scattered throughout the country. In that period unit wages were low, working hours were long, conditions of employment were far from ideal, and profits were uncertain. Then, as now, progressive leaders were striving for higher real wages, shorter hours, improved conditions of employment and stabilization of demand and prices.

That men are not required to work as many hours per week under normal conditions today, that they enjoy a higher standard of living and that conditions of work have been improved are not due to laws written upon the statute books. They are the result of hard-earned economic progress.

• • •

Progress Must Be Earned

The advances, social and economic, in the next decade will surpass anything we have witnessed in the past in this country of superlatives. They will come as a result of the nation's courage and ability to overcome obstacles. But we must work for this progress. It cannot be tendered to us by our lawmakers at Washington. Nor can we hurry progress by giving reform priority over recovery. Achieve sound recovery first. It, above anything else, is the firm foundation upon which an enduring structure of economic and social progress can be erected most speedily.

E. L. Shaner

Regimentation of NRA To Be Boon in Finding New Markets

SCIENTISTS believe that the action of the universe only repeats the action within the atom. By the same token, industry is but the collective activity of men, and prosperity or depression is the objectified state of their thinking.

Facilities for production, natural resources, the craving for creature comforts, labor's desire to be employed, capital's zeal for profits—all these have been substantially the same during the slack years as in the golden age preceding them.

Only Thinking Changes

What really has changed is the thinking about them. The transition from an economy of plenty to an economy of lack has been a mental journey, and exactly that will the return be.

One theory of the depression is that our frontiers have disappeared. In the past, when a man's surroundings irked him or work failed or the going generally became tough, he could strike out for new pastures, principally the West. There he not only started life anew, eliminating himself as a social problem at home, but he also created new markets for the products of those who stayed behind, and thus initiated a new cycle.

Must Stand Its Ground

The fact was, of course, that the unrest was within the man himself; his surroundings were as unchanged as those of this generation have been in the past five years. Instead of applying self-discipline and meeting the problem within himself he took it to a new locale. Which was all right so long as there were new locales, but there were none in 1929.

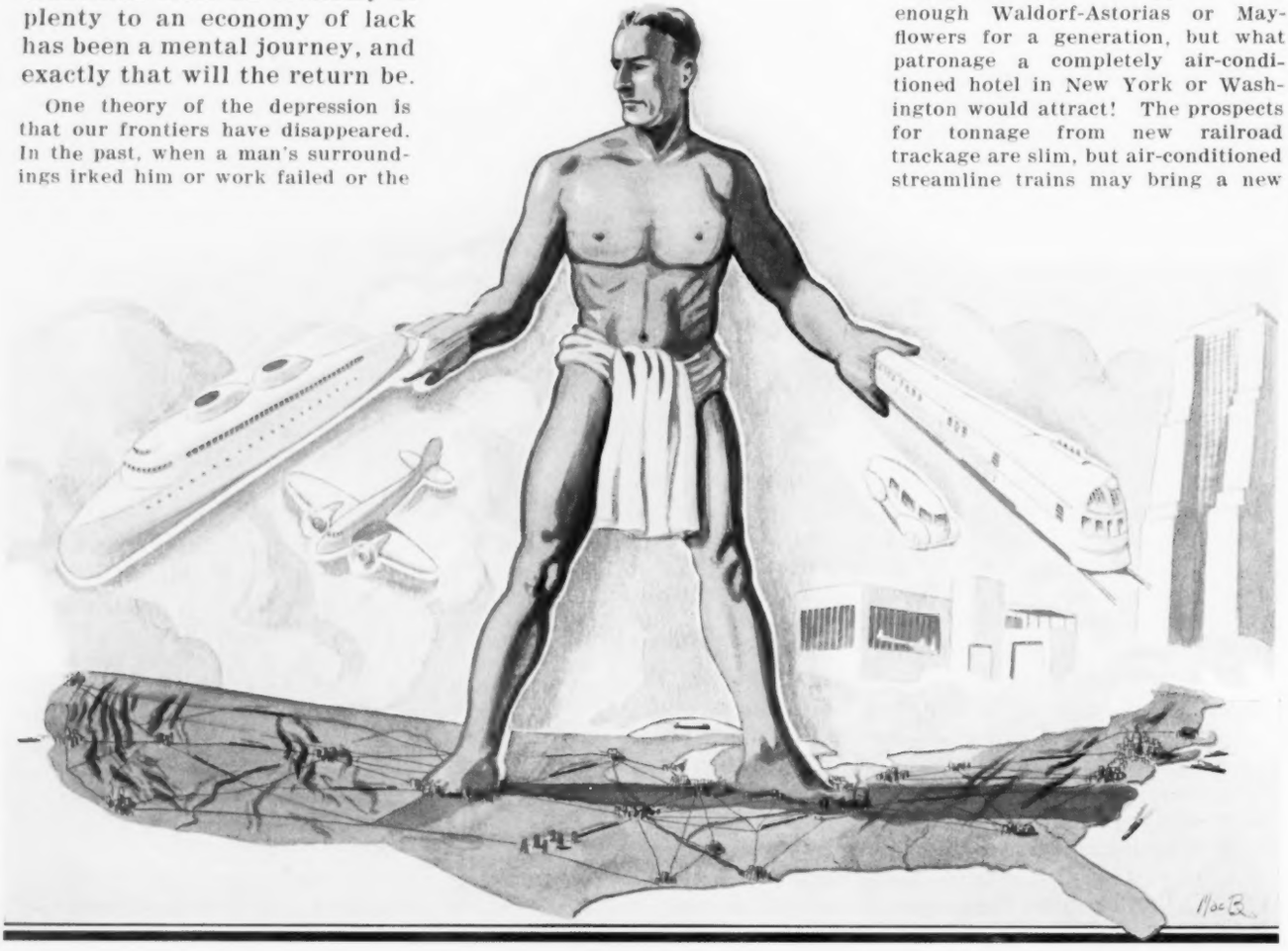
As the enlarged experience of men, industry has been treading the same path. Take steel, meaning thereby iron, steel and the allied metal fabricating and consuming industries. The depression of '73 ended as the West was developed—steel followed men and rolled back its frontiers. The wave of immigration from Europe, precipitated by unrest abroad, swelled the population of the industrial cities of the East and ended the depression of '93—steel backtracked in its course but still was following men.

As recent as 1921 the attainment of volume production by the automobile industry brought salvation to steel—once more men were on the march.

Rehabilitation Is Need

This depression has been different. With no new country to open up, men on the dole have replaced men on westbound freights, and prosperity will return only as each individual adjusts himself to the changing times in his present place. Nor can steel any more wait complacently for old markets to revive or new ones to volunteer. Like men, steel must rehabilitate itself—its methods, products, markets.

Superficially, there appear to be enough Waldorf-Astorias or Mayflowers for a generation, but what patronage a completely air-conditioned hotel in New York or Washington would attract! The prospects for tonnage from new railroad trackage are slim, but air-conditioned streamline trains may bring a new



era in ground transportation! New types of equipment—chassis carrying portable containers of various sizes—may revolutionize freight traffic! Man has achieved prodigies in cheapening and modernizing food and clothing, but shelter for the mass has progressed little in 50 years; the steelframe house, air-conditioned and a marvel of appliances, may conjure up a market for steel beyond present conception. And this only scratches the surface.

Steel, like men, must get off the dole—it must transform its present position into a springboard for recovery. This it can do only through co-operative action, and NRA has laid the groundwork.

Reforms Coming Despite NRA

True, NRA in many respects has been onerous. But the ferment in labor will pass as employment expands, the 8-hour day and 40-hour week would have come anyway, posted prices have probably saved many producers, a stable market has been a benefit to consumers, most of the trade practices that have been prohibited are natural outlaws.

There remains the regimentation of the industry, and this apparent evil can be transformed into an advantage if the common cause and the co-operation shackled on the industry are directed into constructive channels. If the confederation thus forced upon steel is harnessed for the development of tonnage in markets either yet untouched or believed to be depleted, the wrath of the new deal may yet praise the industry.

Looking back to 1934, steel will regard it as a year of captivity or the dawn of opportunity. In either case, NRA will loom large.

FOR steel, 1934 brought relatively few changes in its NRA code. Originally effective on Aug. 19, 1933, and renewed on Nov. 17, 1933, the code on May 30, 1934, was extended by the President for the life of the recovery act, or until next June 16.

On extension of the code in May, several important revisions of pricing provisions were made. It was stipulated that prices filed for a quarter may not be reduced during that quarter. Also, in event a producer has made a reduction effective after the usual 10-day waiting period, competitors may meet that price immediately. A few more producing centers were made basing points. Mill quantity extras on small lots of bars were adopted, but on opposition of NRA similar extras on plates and shapes were suspended.

All through the year a difference of opinion in high quarters on basing points was smouldering. While set up by the industry, basing points listed in the code—and they embrace all but a few producing centers—have the official sanction of NRA. The federal trade commission, still flushed from its victory in 1923 when it abolished Pittsburgh-plus, continued to contend for a universal mill base.

At the request of the President, both the trade commission and NRA investigated, but instead of the joint report requested by the White House the trade commission in December submitted a separate one—presumably hostile to the current setup—and a conference late in December with NRA failed to effect a settlement. The trade commission's attitude supplies fuel for congressional opponents of pricing methods of codes.

In fact, as the year wore on hostility to any price provisions in codes increased. Evidencing its doubt, the new recovery board (pictured below) has instituted hearings beginning Jan. 9 to determine the status of pricing methods. Sentiment in Washington has been tending toward restricting codes to maximum hours, minimum wages, perhaps mandatory collective bargaining (though this may be legislated separately) and probable inclusion of trade practice regulations.

During the year K. M. Simpson, of the International Chromium Process Corp., New York, resigned as division administrator in charge of the steel code, among others, but retained his membership on the code authority. So did Donald R. Richberg, now chief co-ordinator and spokesman for the new deal, despite the press of his enlarged responsibilities.

Institute the Code Authority

This authority is the board of directors of the American Iron and Steel institute, 350 Fifth avenue, New York. For the institute, Walter S. Tower, executive secretary, was the chief contact man for the code; at Washington, R. W. Shannon, a deputy administrator and formerly with the American Sheet & Tin Plate Co., also an author of books on sheet rolling practice, was the steel contact man for NRA.

IN OCTOBER a fuse that had been sputtering most of the year finally reached the charge, and the resulting explosion lifted Gen. Hugh

GENERAL STAFF OF NRA: Superficially at least, it took this board of seven, appointed in October, to succeed Gen. Hugh S. (Crackdown) Johnson. Called the national industrial recovery board, it is governing NRA in the interim between the Johnson one-man era and the revised final form—if any—to issue from the debate whether the recovery act shall be extended beyond next June 16. Left to right, members of the recovery board are Dr. Walton Hamilton, professor of constitutional law at Yale; Leon Henderson, a former lieutenant of General Johnson, liberal and pro-labor; Blackwell Smith, 27-year-old head of the NRA legal division; S. Clay Williams, chairman of the board, who has been head of the R. J. Reynolds Tobacco Co.; Arthur Whiteside, president of Dun & Bradstreet; Dr. Leon C. Marshall, economist and statistical expert; and Sidney Hillman, president of the Amalgamated Clothing Workers and considered one of the ablest and conservative of labor leaders. The board emphasizes that NRA is now under board rule, apparently in contrast with the Johnson regime. It is reported that both Messrs. Williams and Whiteside wish to retire shortly. Wide World photo

Key to Iron, Steel and Allied NRA Codes

Industry	Date Code Approved (usually effective 10 days thereafter)	Address of Code Authority
Air valve	April 9, 1934	
All metal insect screen	Nov. 27, 1933	19 West Forty-fourth street, New York
Alloy casting	Feb. 4, 1934	7 East Forty-fourth street, New York
Automatic sprinkler	Nov. 19, 1933	205 East Forty-second street, New York
Automobile	Sept. 5, 1933	366 Madison avenue, New York
Automotive parts and equipment	Nov. 18, 1933	General Motors building, Detroit
Boiler	Oct. 16, 1933	15 Park Row, New York
Bottling machinery, etc.	April 15, 1934	218 Munsey building, Washington
Brass forging	July 9, 1934	Scovill Mfg. Co., Waterbury, Conn.
Buff and polishing wheel	Nov. 4, 1933	7 East Forty-fourth street, New York
Buffing and polishing composition	Nov. 4, 1933	7 East Forty-fourth street, New York
Business furniture and equipment	Nov. 14, 1933	604 Chester-Ninth building, Cleveland
Canning and packing machinery	Nov. 11, 1933	553 West Randolph street, Chicago
Cast iron boiler, etc.	Feb. 10, 1934	29 Seneca street, Geneva, N. Y.
Cast iron pressure pipe	Jan. 1, 1934	Earle building, Washington
Cast iron soil pipe	Sept. 11, 1933	424 Brown-Marx Bldg., Birmingham
Cement gun contractors	April 4, 1934	5550 Bartlett street, Pittsburgh
Chains	Feb. 10, 1934	931 Barr building, Washington
Chemicals	Feb. 20, 1934	608 Woodward building, Washington
Chilled car wheel	Feb. 26, 1934	1847 McCormick building, Chicago
Clay machinery	April 2, 1934	W. L. Riddell Co., Bucyrus, O.
Coated abrasives	Jan. 8, 1934	17 John street, New York
Compressed air	Oct. 22, 1933	90 West street, New York
Copper	April 26, 1934	
Copper and brass mill products	Nov. 13, 1933	230 Park avenue, New York
Cutlery, manicure implements, etc.	April 5, 1934	278 Main street, Greenfield, Mass.
Die casting	March 18, 1934	505 Arch street, Philadelphia
Drop forging	May 10, 1934	American Drop Forging institute, Cleveland
Electric industrial truck	Feb. 10, 1934	1031 Barr building, Washington
Electrical manufacturing	Aug. 15, 1933	155 East Forty-fourth street, New York
Elevators	March 21, 1934	101 Park avenue, New York
Fabricated metal products (basic code)	Nov. 2, 1933	729 Fifteenth street, northwest, Washington
Fan and blower	Feb. 12, 1934	General Motors building, Detroit
Farm equipment	Oct. 23, 1933	608 South Dearborn street, Chicago
Forged tool	April 3, 1934	1508 Law and Finance bldg., Pittsburgh
Foundry equipment	Feb. 17, 1934	637 Penton building, Cleveland
Foundry supply	Feb. 20, 1934	19 West Forty-fourth street, New York
Gas cock	Nov. 10, 1933	110 South Campbell avenue, Detroit
Gears	Nov. 25, 1933	Penn-Lincoln hotel, Wilkinsburg, Pa.
Gray iron foundry	Feb. 26, 1934	33 Public Square building, Cleveland
Grinding wheel	Jan. 8, 1934	27 Elm street, Worcester, Mass.
Hack saw blade	March 27, 1934	1 Wall street, New York
Hand chain hoist	Feb. 9, 1934	931 Barr building, Washington
Horseshoes, etc.	March 18, 1934	11 Broadway, New York
Industrial furnaces	April 3, 1934	Farms Bank building, Pittsburgh
Industrial safety equipment	March 12, 1934	7 East Forty-fourth street, New York
Iron and steel	Aug. 19, 1933	Empire state building, New York
Limestone	Nov. 24, 1933	203 South Dearborn street, Chicago
Locomotive	May 11, 1934	60 East Forty-second street, New York
Machine knife, etc.	Feb. 16, 1934	111 West Washington street, Chicago
Machine tool, etc., machinery	Nov. 19, 1933	1220 Guarantee Title building, Cleveland
Machine tool, etc. trade	Dec. 8, 1933	Motch & Merryweather Machine Co., Penton building, Cleveland
Machinery and allied products (basic code)	March 28, 1934	701 Bowen building, Washington
Malleable iron	Dec. 7, 1933	Union Trust building, Cleveland
Marine etc. machinery	Feb. 9, 1934	2 Federal street, Bath, Me.
Metal lath	March 26, 1934	608 South LaSalle street, Chicago
Metal tank	Dec. 25, 1933	120 South LaSalle street, Chicago
Metal treating	April 9, 1934	1333 West Pierce street, Milwaukee
Metal window	Jan. 22, 1934	Chandler building, Washington
Metallic wall	Jan. 15, 1934	441 Terminal tower, Cleveland
Nonferrous foundry	Dec. 25, 1933	47 Fulton street, New York
Nonferrous and steel convector	Feb. 19, 1934	308 West Washington street, Chicago
Oil burners	Sept. 23, 1933	342 Madison avenue, New York
Oxyacetylene	Dec. 18, 1933	75 East Wacker drive, Chicago
Packaging machinery	Nov. 11, 1933	50 Pine street, New York
Paper making machine builders	Dec. 18, 1933	420 Dixie Terminal building, Cincinnati
Plumbago crucible	Oct. 30, 1933	90 West street, New York
Porcelain enameling	April 9, 1934	612 North Michigan avenue, Chicago
Pumps	Oct. 22, 1933	90 West street, New York
Railroad special track equipment	April 6, 1934	17 John street, New York
Railway brass car bearings, etc.	Feb. 12, 1934	208 South LaSalle street, Chicago
Railway brass journal	Jan. 29, 1934	208 South LaSalle street, Chicago
Railway car appliance	Feb. 19, 1934	310 South Michigan avenue, Chicago
Railway car building	Feb. 21, 1934	19 Rector street, New York

(*Please turn to Page* 230)

S. Johnson, administrator of NRA since its inception in June, 1933, completely out of NRA.

The line of cleavage was between the general, on one side, and Donald Richberg, chief counsel for NRA, and Secretary of Labor Perkins, on the other. The successor to one-man domination was the national industrial recovery board.

In mid-year, prior to General Johnson's departure, a change in policy became evident. The program of extending the blue eagle to every factory and shop window slowed down. Little by little, the smaller service trades and small industry were freed from what was a death grip.

At the close of December, 541 codes were in effect. It was estimated that of the 24,000,000 industrial workers in the United States, 22,000,000 were under codes. Seventy-five per cent of all industrial workers are grouped under 36 of the largest codes. Approximately half of the workers under codes are in factories, one fourth in the service trades and one fourth in wholesale and retail establishments.

Still Debate Structural Code

For all practical purposes, the only department of the iron and steel industry not codified was the structural fabricating group. After co-operating for almost nine months, the code for this group emerged on July 22 minus provisions covering the erection of steel; these provisions had been transferred to the construction code and threatened with the closed union shops. So determined was the fabricators' opposition, the code was stayed several times, and at the year-end the matter still was before the recovery board.

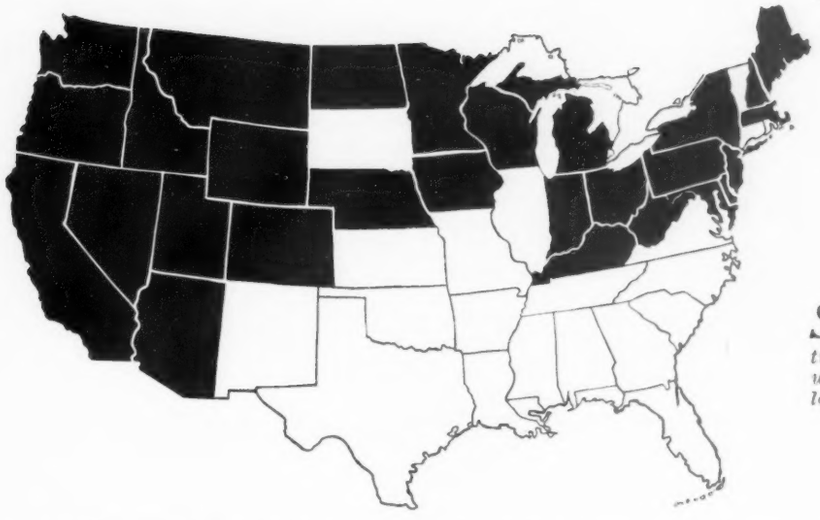
In addition to the 541 codes, there are over 177 supplements, and more than 500 amendments have been approved.

Whether attributable to NRA or to natural forces making for recovery, the showing of industry is improving. The following comparison of profits and deficits for important industrial groups for the first nine months of 1933 and 1934 is by the National City bank, New York:

	1933	1934
190 industrial corporations	$182,000,000	$321,000,000
12 steel	43,265,000*	14,772,000*
17 automobile accessories	2,725,000	9,488,000
12 machinery	1,564,000*	4,311,000
15 petroleum	6,835,000*	17,082,000
7 textile	2,598,000	1,631,000
12 food products	41,559,000	42,448,000
5 electrical equipment	5,082,000	15,413,000
13 chemicals	49,114,000	70,793,000
8 building materials	2,947,000*	3,250,000

Asterisks indicate deficits; other figures are profits.

Wages, Employment Raised; Social Legislation Coming



SPREAD OF STATE PENSIONS: Three-fifths of the country's population live in the 28 states (shown in black) which have adopted old-age pension legislation. Average payment $18.75 monthly

LABOR profited in full measure through industrial improvement in 1934. Wages were raised, employment was increased, and labor organization received its greatest impetus since the World war.

In iron and steel, the 10 per cent advance last April restored the 44-cent an hour common labor level that prevailed from 1923 to 1931, while steelworks operations for the year were only 37 per cent of capacity.

The steel code in its first full year added $95,000,000 to the industry's payroll, which for the year 1934 was $460,000,000, distributed to 400,000 employes, averaging $1150 per employe. Whatever deficiencies there may have been in gross earnings for labor resulted from code restrictions against longer hours. Saturday morning work was eliminated for salaried forces, with corresponding reductions.

Industrial codes raised and steadied wages, minimizing the number of disputes involving this issue, usually uppermost in recovery periods. On the other hand, labor was encouraged to organize, and the most serious contentions arose from the ambiguity of section 7a, national recovery act, concerning this right.

Offer To Recognize Unions

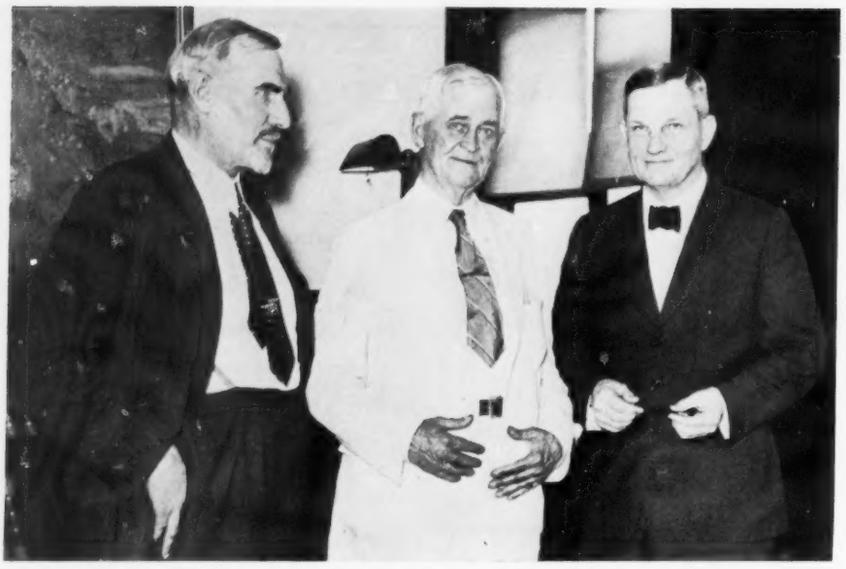
Decisions by the national labor board straddled the question as to union recognition in open shops. In March an automobile strike was averted by a 10 per cent wage increase, 10 per cent reduction in hours, and appointment of a mediation board by the President.

A strike for recognition in the steel industry, threatened by the Amalgamated Association of Iron, Steel and Tin Workers, failed to materialize in June when the President appointed a steel labor relations board. These palliatives failed to placate union labor, which continued to harass the steel industry, more so in the last half of the year than in the first. Practically all steel plants conducted elections to permit employes to choose representatives.

Finally, agreeing to the President's proposal for a labor truce, the steel industry through the United States Steel Corp. offered to recognize outside unions in proportion as they could show membership in the plants. This was countered with demands which virtually dictated a closed union shop—and there the issue is today.

Co-operation by the steel industry with labor in a common cause never before reached a higher point than it did in 1934. Aside from the real benefits reaped by labor, the year was chiefly interesting for steps taken toward social legislation, such as unemployment insurance and retirement pensions.

It appears reasonably certain some form of unemployment insurance, resulting in a payroll tax, will be en-



SUPREME IN STEEL LABOR DISPUTES: In June last year, when a strike was threatened, President Roosevelt appointed the national steel labor relations board. Left to right are Dr. James A. Mullenbach, of Chicago, long prominent in the garment trades, but who resigned from the textile labor board because of ill health; Admiral H. A. Wiley, retired; Judge Walter P. Stacy, chief justice, North Carolina supreme court, chairman of the board. Wide World photo

acted by congress. Old-age pension legislation has swept through the states without, however, accomplishing its purpose, and it is only a matter of time until a government-sponsored, contributory system will be set up. As a consequence industrial welfare work may languish.

Industry Leads in Pensions

FIVE million employes in private industries in this country are working under old-age pension systems, and approximately 150,000 retired are drawing pensions, 15,000 from the iron and steel industry.

Seventy-four million people live in the 28 states that have old-age pension laws, but only 115,547 are receiving state pensions.

The score is much in industry's favor, although the combined pension rolls—private and state—contain less than 275,000 names — in a country with more than 40,000,000 normally engaged in gainful occupations, and 7,000,000 inhabitants aged 65 or older.

In Germany 18,000,000 workers have old-age pension insurance, in Great Britain 16,500,000, France 10,000,000. Employers and employes in these countries contribute to the funds and in France they are supplemented with government money.

An important difference between public old age pension systems as established in the states and those in the three leading European countries is that here they are noncontributory, offer no equities or guarantees.

This also was characteristic of our industrial pension systems up to about ten years ago, since which there has been a strong trend toward contributory and funded pension insurance. In the same period group life insurance has made tremendous strides.

The number of "pension states" has increased from two to 28 in ten years. But pensions they disburse are little more than doles, or paupers' pittances, part of poor relief, maximum $1 a day, average $18.75 a month.

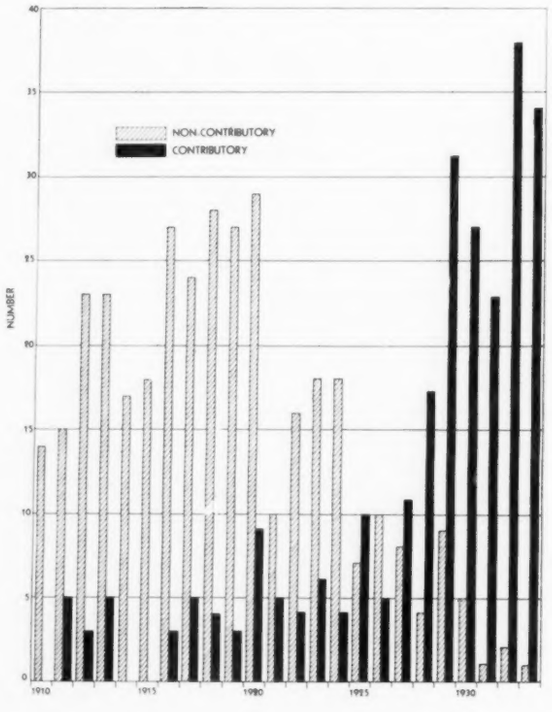
States have recognized a need, and have assumed a responsibility, without providing adequate means, or attempting to set up contributory pension insurance. This has created a major national political issue for a federal system, which though subordinated for the present, remains to be fought out in congress, the President committed to pensions.

Steel Pensions Surveyed

FOR every group of 100 workers in iron and steel manufacture there are about three receiving pensions from the industry. The proportion is about the same as for all industrial employes under pension systems.

Steel, through the United States Steel Corp., and Andrew Carnegie, pioneered in old-age pensions, but relatively few companies have followed the lead. Among the 20 dominant companies, with about 340,000 employes there are, so far as STEEL has been able to ascertain, only four with established systems. One of these, due to receivership, is not functioning. Four others state they "care for" or "contribute to the support of" superannuated employes as circumstances require. In this group, it is indicated, there are not over 500. Several are considering pension plans.

By far the largest number of steel pensioners are on the Steel corporation's list—12,282. Bethlehem Steel Corp. is second with 1862. A third



CONTRIBUTORY PLANS MOST POPULAR: Prior to 1925 the majority of industrial pension plans were of noncontributory type, in which employes had no equities. Comparatively few noncontributory plans are being established today, while the contributory type have increased to record proportions

Courtesy Metropolitan Life Insurance Co., New York

company has 339 and a fourth only 28.

This year completes a quarter century for the Steel corporation's fund, the twelfth year for Bethlehem's. The corportaion has paid out $59,000,000; Bethlehem $7,500,000. Colorado Fuel & Iron Co., whose system was adopted in 1917, has disbursed $1,643,000. Here there is a total of over $68,000,000 for the three outstanding steel pension companies.

The Steel corporation's pensions are approximately $7,700,000 a year; Bethlehem's $830,000; while Coloradio's, which were $120,190 in 1933, have been reduced by court order.

Steel corporation and Bethlehem payments average $600 a year to a pensioner—compared with $225 which the federal government reports as the average for public pensions in the states.

Like state systems, steel's are noncontributory. The Steel corporation's rule was to allow 1 per cent of the average monthly pay received during the last ten years of the employe's service, but this was modified in 1933 by reducing the amount of pensions, calculated by such rule, in varying proportions from 5 per cent on pensions of $35.01 to $40 per month, up to 25 per cent for the highest amounts paid. Bethlehem's are based on 1 per cent of the average yearly wage for ten years prior to retirement, multiplied by the number of years employed. Maximum is $100 per month, minimum $15.

Men employed by either of these companies are eligible to pensions at the age of 65, after 25 years service, women at 55.

In Related Industries

IN INDUSTRIES related to steel, two conspicuous examples of what has been done by some of the larger interests are those of the General Electric Co. and Westinghouse Electric & Mfg. Co.

General Electric has 3300 on its pension rolls, averaging $800 a year. Since 1912 it has disbursed $10,415,000 in annuities. In 1928 it established an "additional pension plan" which in reality is a savings plan to which employes contribute.

Westinghouse has 1102 retired employes receiving annuities. It adopted a pension system in 1914, revised it in 1929 to a contributory arrangement on an actuarial reserve basis, and "due to business conditions" amended this in 1934. It is contributing $53,000 monthly to an annuity fund.

Both General Electric and Westinghouse plans contain a significant clause. If the federal government, or any state or county in which the company operates adopts a pension law, to the support of which the company contributes directly or indirectly, the company's pension payments may be reduced by the amount received by a pensioner under such law.

With one state after another going in for pensions—mandatory in 23 out of the 28—and taxes being applied to this purpose, it would seem employers would have awaited the outcome, especially in a depression. But the number of industrial pension plans has been rising and the increase has been most conspicuous since 1930—the same period in which the majority of pension states have adopted their legislation.

The explanation of these apparently conflicting trends is that the constant political pressure for public pensions presented a challenge to industry; the laws did not provide sufficiently, and did not appease the demand for more.

With a powerful drive for a federal insurance system to which all employers and employes presumably would contribute the situation may be reversed.

Heavy Liability Incurred

RELATIVELY few companies in steel or other industries have the resources to set up their own noncontributory, self-administered pension funds. Over a period of years a staggering liability is incurred. By 1933 it was estimated fully one-third of the private pension systems that had been inaugurated had been discontinued or radically revised.

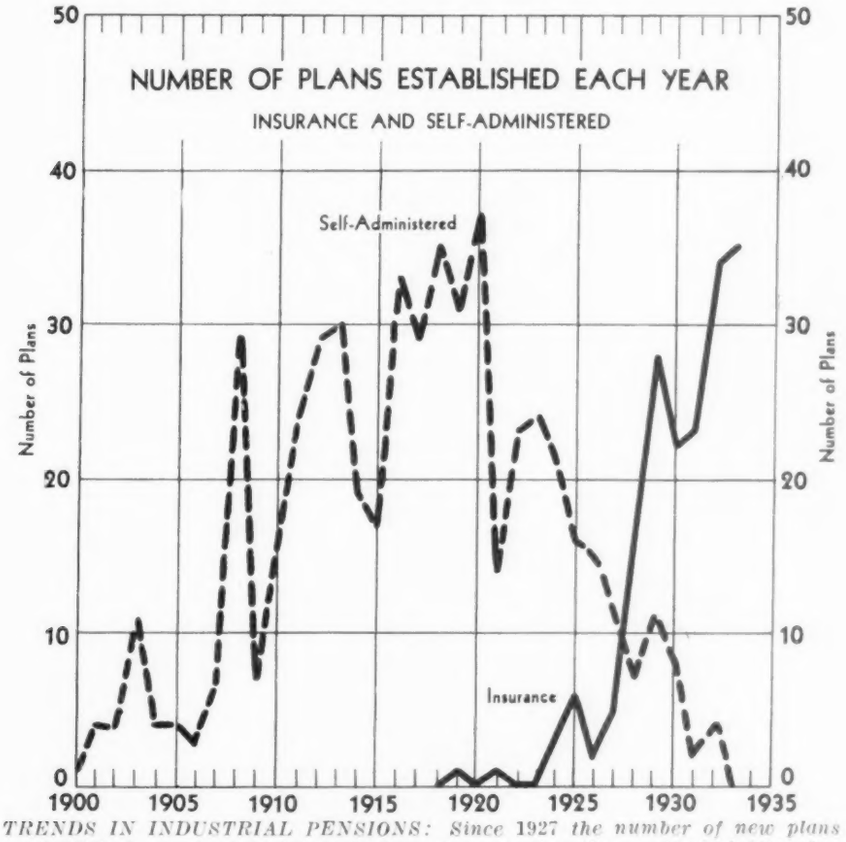
Since 1930 there have been practically no new systems started on a noncontributory, nonfunded or self-administered basis. On the other hand, the number of plans have reached new peaks, and they are of the contributory, funded and insurance-administered type.

Virtually all plans recently adopted by small steelworks and allied manufacturing industries fall in this class. The companies contribute to the pension premiums, and employes are guaranteed against loss by insurance companies. This is the newest and for several years has been the fastest growing form of group insurance. Eight leading insurance companies report a total of more than 250 policies now in force providing 200,000 workers with an average of $43.53 per month.

The 200,000 thus guaranteed pensions—or the return of their money if they should change employment or discontinue contributing to the premiums—constitute only 4 per cent of the 5,000,000 working under pension systems.

Eighty-four per cent of the group

(*Please turn to page* 128)



TRENDS IN INDUSTRIAL PENSIONS: Since 1927 the number of new plans established on an actuarial basis have far exceeded those self-administered

Consumption Ratios of Main Groups

	1934	1933	1932	1931	1930	1929	1928	1927	1926	1925	1924	1923	1922
Automotive....	20.87	20.95	18.15	14.78	14.10	17.57	17.76	13.34	15.09	14.60	11.37	10.59	8.98
Railroads.....	12.96	8.04	9.09	14.65	16.95	18.44	17.02	20.37	22.81	22.26	27.54	31.02	24.96
Buildings.....	12.70	12.18	16.38	16.80	17.80	14.70	15.22	14.89	13.10	15.26	14.44	13.53	11.84
Containers.....	8.68	12.25	10.79	7.90	5.77	4.67	4.56	5.21	5.24	4.20	4.96	3.68	4.16
Exports.....	5.29	3.61	3.31	4.10	4.34	4.83	5.52	5.39	5.29	4.47	5.89	6.22	7.82
Oil, gas, water..	4.97	4.88	5.50	9.75	9.48	9.01	7.72	8.90	9.29	8.03	8.43	10.60	14.84
Machinery.....	3.65	3.63	3.39	3.37	3.80	3.81	3.48	2.79	2.65	2.69	3.69	2.63	2.83
All other.....	30.88	34.46	33.39	28.65	27.76	26.97	28.72	29.11	26.53	28.49	23.68	21.73	24.57

Autos Hold Lead as Steel Consumer, Railroads Second

FOR the second consecutive year, STEEL'S annual figures on the distribution of finished rolled steel reflect marked shifts in the ranking of the principal consuming groups.

The automobile industry retains its position of leadership by a wide margin, again accounting for one-fifth of the total output.

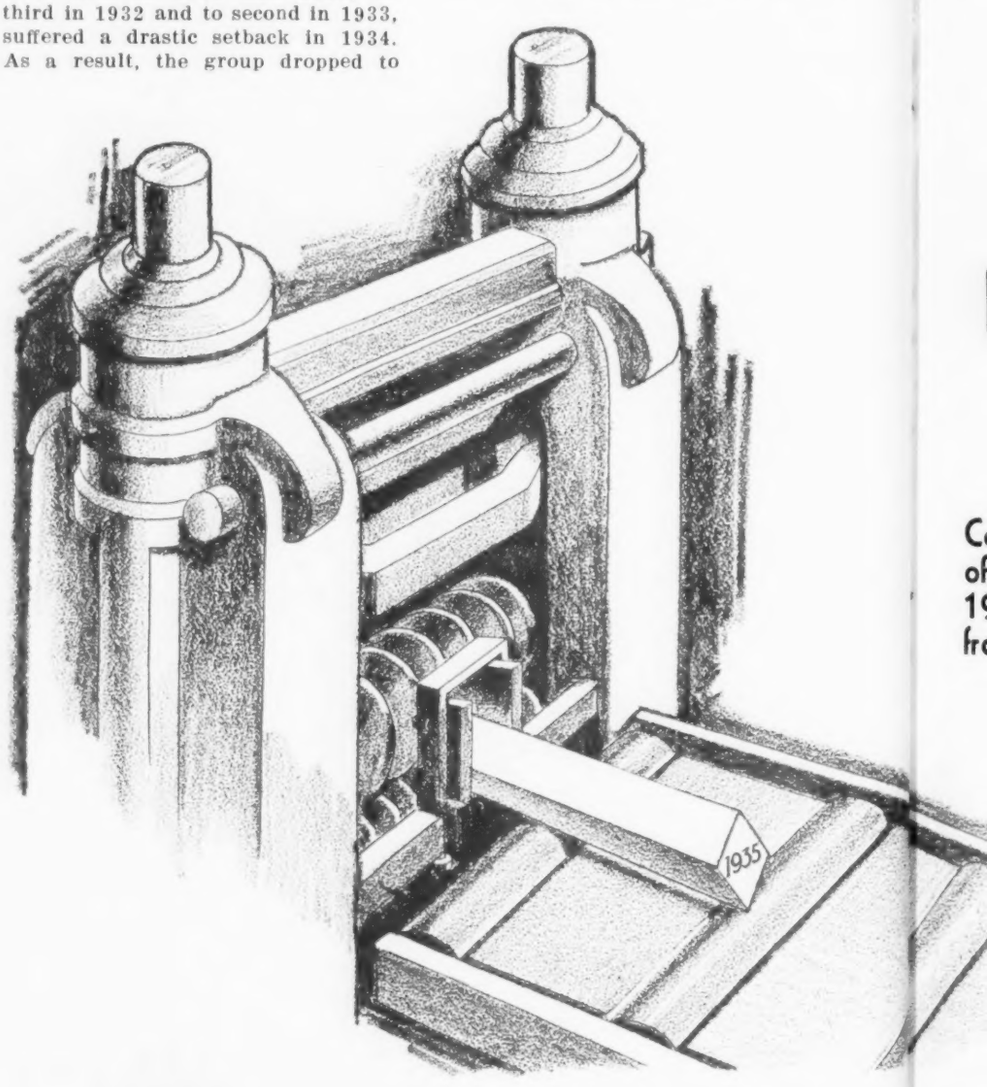
Railroads, ranking a poor fourth in the 1933 tabulation, finished in second place in 1934. They barely nosed out the building group, which remains in its 1933 position of third place.

Containers, which had advanced from fifth in 1930 and 1931, to third in 1932 and to second in 1933, suffered a drastic setback in 1934. As a result, the group dropped to fourth place. Exports, which usually rank seventh or lower, in 1934 surpassed the oil, gas and water, and machinery, tools and equipment classifications and established a claim upon fifth place.

These ratings are derived from reports on the distribution of finished rolled steel furnished by 87 operating companies. The table on page 114 shows the actual tonnage as reported. The percentage table on page 113, the illustration on the same page, the 1934 figures in the

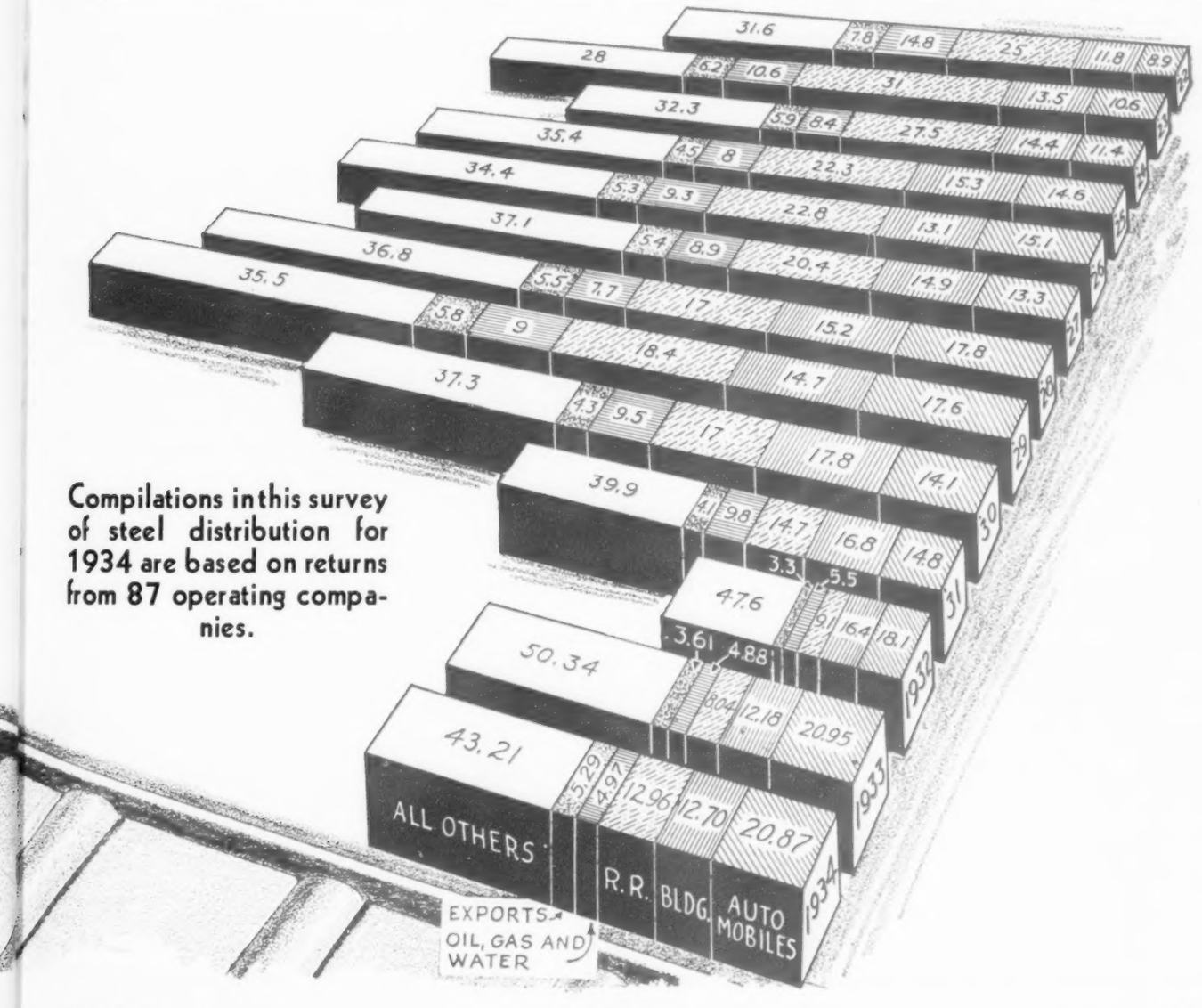
How Steel Ingots Shrink

		Gross tons
Steel ingot production, 1934 (11 months actual, December estimated).....		25,403,000
Ingots to forgings direct....		275,000
		25,128,000
Loss in conversion, ingots to semifinished (20 per cent)..		5,025,600
Semifinished steel production		20,102,400
Loss in conversion, semifinished to finished steel (10 per cent).....		2,010,240
Total finished rolled steel...		18,092,160
Distribution:	% of total	
Automotive.....	20.87	3,775,833
Railroads.....	12.96	2,344,744
Buildings.....	12.70	2,297,703
Containers.....	8.68	1,570,400
Exports.....	5.29	957,075
Oil, gas, water...	4.97	899,181
Machinery.....	3.65	660,364
All other.....	30.88	5,586,860
Totals.....	100.00	18,092,160



Distribution of Steel in Per Cent to Consuming Groups

	Rails, heavy and light	Angle bars, steel ties and other track accessories	Plates	Structural shapes over 3 inch	Bars, except concrete bars, and shapes under 3 inch	Concrete bars	Black plate for tinning	All other black plate and sheets except galv. sheets	Galvanized sheets	Strip steel	Tubing and pipe	Wire products
1—Railroads												
a Cars and locomotives	....	1.68	18.85	8.76	6.68	0.26	0.05	2.10	1.74	0.99	1.93	1.24
b Track construction and repair	90.69	90.46	0.60	0.32	0.49	....	....	....	....	0.08	0.08	0.68
c Buildings and bridges	0.01	0.08	1.92	4.23	0.56	1.75	....	0.04	0.07	0.05	0.01	0.33
2—Buildings												
a Erection materials, framework, trim, etc	0.06	0.05	16.50	53.36	6.04	26.08	0.21	1.99	5.50	1.45	1.26	5.62
b Furnishings, furniture, stoves, refrigerators, etc	....	....	0.44	0.66	2.13	....	1.90	13.39	5.37	2.96	0.73	5.18
c Other miscellaneous products for buildings	....	....	1.41	0.10	0.39	0.19	0.26	1.49	5.27	1.50	2.94	0.04
3—Highways and highway bridges	....	....	1.07	4.07	1.13	50.64	....	0.49	10.24	0.31	0.02	3.71
4—Automotive	0.01	....	4.29	0.73	42.27	0.01	0.06	42.37	1.04	55.09	5.01	9.78
5—Oil, gas and water	....	0.01	11.68	2.07	0.90	0.71	1.42	2.06	0.40	0.41	32.24	0.75
6—Mining, quarrying, lumbering	2.49	3.09	1.25	1.05	1.00	0.12	0.01	0.24	0.50	0.10	0.26	0.81
7—Agricultural	0.02	0.01	0.96	0.38	5.24	1.68	0.05	2.05	2.70	2.55	0.21	9.31
8—Shipbuilding and repair	0.01	....	7.96	2.59	0.92	0.02	....	0.07	0.15	0.02	0.38	0.33
9—Machinery, tools, equipment (including electrical)	0.06	0.06	5.70	5.00	5.99	0.52	0.14	5.59	0.78	4.20	3.61	2.52
10—Food and packing industry (all containers)	....	0.07	1.02	0.11	0.33	....	73.57	7.14	2.17	4.16	0.78	2.16
11—Exports	5.66	2.05	3.55	3.58	2.00	3.48	15.86	3.21	9.42	2.32	6.72	7.94
12—Miscellaneous	0.36	0.54	16.21	3.22	15.10	0.87	3.50	8.61	2.64	20.22	7.84	13.38
Jobbers	0.63	1.90	6.59	9.77	8.83	13.67	2.97	9.16	52.01	3.59	35.98	36.22
Grand totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00



Compilations in this survey of steel distribution for 1934 are based on returns from 87 operating companies.

comparative table at the top of page 112 and the percentages in the table headed "How Steel Ingots Shrink" all are based on the reported tonnages shown on page 114. The tonnage figures under "How Steel Ingots Shrink" are computed from the estimated annual production of steel ingots, and are intended to show how the total of finished rolled steel would be distributed according to the percentages derived from figures reported by the 87 companies.

Readers are reminded that the "finished rolled steel" reported in these figures is different from the "rolled iron and steel" in the annual statistical report of the American Iron and Steel institute. The institute includes skelp, wire rods and several other semifinished items, whereas in the accompanying report, STEEL uses the tonnage of pipe and tubing, wire and wire products, etc.

An explanation of the shift in the ranking of the railroad and container consuming groups is found in the drastic changes in the production of steel rails and tin plate in 1934 and 1933.

Sharp Increase in Rails

Producers of rails reported a tonnage of 1,007,746 for 1934—about 2½ times the output of 408,206 tons reported by the same makers in 1933. The output of angle bars, tie plates and track accessories was up about 70 per cent.

On the other hand, the reported production of black plate for tinning declined from 1,745,337 tons in 1933 to 1,418,182 tons in 1934. In spite of this decrease of almost 19 per cent in production, exports of tin plate increased from 129,194 to 224,881 tons. Thus the decline in domestic consumption of tin plate made in the United States was even greater than the loss in production. Large stocks of plate were carried over from 1933.

Production of plates, shapes, bars, sheets, strip, tubing and unclassified products of rolled finished steel increased in 1934 from 1933 totals. The gains in shapes, strip and pipe and tubing were particularly noticeable. The change in bars was slight.

The only loss in production from 1933, aside from that of tin plate, was incurred by wire products, and here the drop was 10 per cent.

Distribution of Steel in Gross Tons to Consuming Groups

Based on 1934 Returns from 87 Operating Companies

	Rails, heavy and light	Angle bars, steel ties and other track accessories	Plates	Structural shapes over 3 inch	Bars, except concrete bars, and shapes under 3 inch	Concrete bars	Black plate for tinning	All other black plate and sheets except galv. sheets
1—Railroads								
a Cars and locomotives	42	6,325	222,173	91,822	146,185	1,045	727	52,304
b Track construction and repair	913,962	341,172	7,090	3,402	10,737	.....	.....	8
c Buildings and bridges	81	316	22,585	44,362	12,317	7,042	38	965
2—Buildings								
a Erection materials, framework, trim, etc	562	196	194,529	559,269	132,225	104,828	3,008	49,686
b Furnishings, furniture, stoves, refrigerators, etc	.....	1	5,205	6,909	46,558	.....	27,014	334,234
c Other miscellaneous products for buildings	.....	2	16,599	1,000	8,527	754	3,632	37,175
3—Highways and highway bridges	.....	.....	12,560	42,627	24,725	203,562	.....	12,281
4—Automotive	129	2	50,617	7,673	925,438	65	878	1,057,713
5—Oil, gas and water	.....	30	137,658	21,724	19,779	2,840	20,086	51,509
6—Mining, quarrying, lumbering	25,116	11,645	14,769	10,975	21,941	479	138	6,004
7—Agricultural	199	36	11,363	3,998	114,771	6,767	731	51,135
8—Shipbuilding and repair	94	11	93,835	27,097	20,215	76	.....	1,753
9—Machinery, tools, equipment (including electrical)	549	226	67,150	52,352	131,063	2,094	1,999	139,753
10—Food and packing industry (all containers)	.....	248	12,063	1,192	7,157	1	1,043,278	178,153
11—Exports	56,992	7,749	41,786	37,535	43,759	13,980	224,881	80,113
12—Miscellaneous	3,657	2,019	191,055	33,702	330,487	3,506	49,688	214,949
Totals	1,001,383	369,978	1,101,037	945,639	1,995,884	347,039	1,376,098	2,267,735
Jobbers	6,363	7,168	77,629	102,438	193,364	54,947	42,084	228,582
Grand totals	1,007,746	377,146	1,178,666	1,048,077	2,189,248	401,986	1,418,182	2,496,317

	Galvanized sheets	Strip steel	Tubing and pipe	Wire products	All other finished steel products	Grand totals	Per cent of total
1—Railroads							
a Cars and locomotives	13,598	18,899	30,190	15,581	65,022	663,913	4.18
b Track construction and repair	7	1,491	1,253	8,498	12,717	1,300,337	8.19
c Buildings and bridges	533	993	136	4,112	744	94,224	0.59
2—Buildings							
a Erection materials, framework, trim, etc	42,974	27,634	19,770	70,534	28,015	1,233,230	7.77
b Furnishings, furniture, stoves, refrigerators, etc	41,898	56,370	11,348	64,932	3,371	597,840	3.77
c Other miscellaneous products for buildings	41,142	28,604	46,016	492	482	184,425	1.16
3—Highways and highway bridges	79,945	5,942	249	46,586	3,225	431,702	2.72
4—Automotive	8,117	1,050,650	78,505	122,590	9,212	3,311,589	20.87
5—Oil, gas and water	3,107	7,831	504,685	9,347	10,688	789,284	4.97
6—Mining, quarrying, lumbering	3,886	2,022	4,124	10,197	5,910	117,206	0.74
7—Agricultural	21,056	48,587	3,323	116,691	4,810	383,467	2.42
8—Shipbuilding and repair	1,168	365	5,906	4,137	175	154,832	0.98
9—Machinery, tools, equipment (including electrical)	6,100	80,054	56,591	31,639	9,615	579,185	3.65
10—Food and packing industry (all containers)	16,953	79,363	12,287	27,106	12	1,377,813	8.68
11—Exports	73,537	44,169	105,158	99,625	9,365	838,649	5.29
12—Miscellaneous	20,630	385,687	122,699	167,759	61,409	1,587,247	10.00
Totals	374,651	1,838,661	1,002,240	799,826	224,772	13,644,943	85.98
Jobbers	406,058	68,533	563,284	454,234	21,069	2,225,753	14.02
Grand totals	780,709	1,907,194	1,565,524	1,254,060	245,841	15,870,696	100.00

Where Alloy Steel Went, 1928-1934

Percentage of Consumption by Groups

	1928	1929	1930	1931	1932	1933	1934
Automotive	79.67	61.40	62.23	72.67	77.64	68.28	53.31
Machine tool	2.65	6.34	8.95	6.17	3.54	3.57	4.88
Oil industry	0.87	4.07	4.73	1.16	0.82	1.96	1.52
Agricultural	0.49	4.05	5.94	3.30	1.69	2.07	2.42
Construction	0.60	3.72	1.00	1.09	0.68	0.66	1.55
Export trade	1.18	1.38	1.16	0.88	0.43	0.29	0.58
Railroads	1.17	1.02	2.66	1.83	1.92	0.92	4.11
Shipbuilding	0.28	0.22	0.79	0.52	0.42	0.47	1.21
Miscellaneous	13.09	17.80	12.54	12.38	12.86	21.78	30.42
Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Consumption of Alloy Steel Is More Diversified in 1934

REPORTS on the distribution of finished rolled or forged alloy steel in 1934 from companies whose production of alloy steel ingots aggregated more than 750,000 tons indicate a further reduction in the commanding lead of the automobile industry as No. 1 consumer, and attendant increases for several other classifications.

The 53.31 per cent allotted to the motor car industry is the lowest figure recorded since this series of statistics was inaugurated. The most noteworthy gains were credited to the railroad, construction, shipbuilding, machine tool and machine tool consuming groups.

An even more impressive increase is shown for the miscellaneous or unclassified consumers. The percentage of 30.42 for this group represents a marked gain over the corresponding ratio of 21.78 per cent for 1933, and is more than double the figures for previous years. This undoubtedly reflects the marked growth in the diversity of alloy steel uses.

While the returns, from which the accompanying tables are derived, are believed to be representative of the entire industry insofar as they indicate the distribution of alloy steel, they are not as inclusive as desired. While STEEL is accorded the co-operation of practically every producer and seller of carbon steel, it has not been able to elicit an equally general response from producers of alloy steel. This is due in part to certain peculiarities in the character of the industry. In spite of this condition, all but one of the major producers supply the desired information on alloy steel. With the co-operation of this interest, together with that of a number of smaller concerns, the returns would permit the publication of tonnage figures.

Production Up 23 Per Cent

Although the production of all steel ingots for 1934 showed a gain of about 12 per cent over that of 1933, the output of alloy steel appears to be 23 per cent or more above that of the previous year. Thus alloy steel again demonstrates its ability to keep ahead of carbon steel in the march toward recovery.

As in recent years, much of the interest in alloy steel centers upon the steels and irons of the chromium-nickel series. In response to widespread requests STEEL this year obtained from many producers the figures on their production of chromium-nickel and straight chrome alloys. These statistics, in conjunction with those of future years, will permit a check on the production trend.

The Chemical foundation, starting July 1, 1934, now is tabulating the tonnage of alloy steel produced under its patents. These figures, when available, will fulfill an urgent demand for data on these steels.

Indicative of the trend of production of chromium-nickel alloys, the Chemical foundation furnishes the following information on the dollar value of sales of these steels. The figures are in percentages, based on the assumption that the dollar value of sales in 1926 equaled 100 per cent:

	Per cent		Per cent
1926	100	1930	16,907
1927	305	1931	9,096
1928	1,898	1932	6,702
1929	5,286	1933	7,771

Output of the stainless alloys in

Distribution by Percentage of Alloy Steel in 1934

Shown by Consuming Groups and Individual Products

Group	Hot rolled bars	Cold drawn bars	Sheets	Plates	Pipe and tubes	Wire	Structural shapes	Hot rolled strip	Cold rolled strip	Tool steel	Forgings
1. Automotive	64.86	48.08	4.27	3.80	0.13	4.10	0.13	49.44	14.15	45.81	4.67
2. Machine tool	4.31	8.41	1.33	4.71	0.13	....	3.34	10.20	9.78	21.56	14.31
3. Railroad	1.19	2.24	1.60	5.31	0.14	....	8.16	6.37	....	2.75	22.29
4. Agricultural	2.70	2.77	0.54	0.98	0.20	17.01	....	0.20	0.21	2.32	....
5. Construction	0.19	0.73	2.85	57.83	1.05	....	75.40	0.41	0.28	2.75	41.87
6. Shipbuilding	0.50	0.39	0.18	9.05	0.80	....	3.61	....	....	1.45	....
7. Oil industry	0.61	22.86	0.47	2.88	10.12	....	....	....	....	0.15	....
8. Exports	0.72	1.34	0.73	0.48	23.75	0.98	....	....	0.07	0.20	6.47
9. All other	24.92	13.18	88.03	14.96	63.68	77.91	9.36	33.38	75.51	23.01	10.39
Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

1934 is estimated to be equal to or in excess of the production for 1931.

Of major significance in the field of alloy steel development during 1934 was the increasing prominence of steels in the low-alloy high-tensile classification. While this general type of steel is not new, the tendency to exploit uses and to develop new compositions was a trend of the year.

Included in this group of steels are such grades as low nickel (2.0-3.5 per cent); medium manganese; high-tensile "silicon"; copper steel (1.25-1.75 per cent); chromium-manganese-silicon; chromium-vanadium; chrome-molybdenum; carbon-vanadium; manganese - vanadium; manganese-molybdenum; high "silicon" plus molybdenum; low-carbon chromium-silicon-copper (Cor-Ten); and medium manganese with copper (Man-Ten).

How Alloy Steel Was Used, 1928-1934

Percentage of Consumption by Products

	1928	1929	1930	1931	1932	1933	1934
Hot rolled bars	81.70	61.87	70.50	54.48	77.28	69.81	68.73
Cold drawn bars	5.23	11.43	5.32	25.65	11.68	19.05	14.99
Sheets	0.72	11.03	0.94	0.69	1.14	1.29	10.20
Plates	0.56	1.04	3.05	1.95	0.65	0.59	1.28
Pipe and tubes	5.93	6.33	8.84	8.60	4.80	3.57	1.75
Wire	1.19	0.05	0.08	0.06	0.28	0.33	0.25
Structural shapes	0.29	0.12	0.42	0.07	0.11	0.01	0.19
Hot rolled strip	0.95	4.43	3.86	1.31	0.66	2.88	0.49
Cold rolled strip	0.03	0.09	0.06	0.04	0.43	0.51	0.35
Tool steel	1.64	1.36	0.80	2.03	1.07	0.48	1.60
Forgings	1.76	2.25	6.13	5.12	1.89	1.48	0.17
Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00

The aim in applying these steels is to obtain high corrosion resistance and lighter weight without sacrifice of strength and without increasing cost substantially. Typical uses are for structural members in ships, railroad cars, bridges, tanks and boilers.

In general, alloying elements in these steels total less than 4 per cent, in some cases much less. Tensile strengths average approximately from 75,000 to 100,000 pounds per square inch, "as-rolled," with good ductility and high elastic limit. Some possess excellent welding properties and fatigue resistance. As regards corrosion, the steels group themselves in two classes: (1) corrosive in the atmosphere; and (2) moderately noncorrosive in the atmosphere.

Some of these steels are finding ready acceptance in the railroad car-building industry, as indicated elsewhere in this issue.

The past year has been one of unusual activity for alloy steels in the railroad field. Stainless steel of the 18-8 chrome-nickel grade has been the choice of material in many instances. Superior corrosion resistance of stainless over the low-alloy steels cannot be gainsaid; however, its high cost must be reckoned with. What has probably done more than anything else to spur the use of stainless steel in this field is the development of the shotwelding process by the Edward G. Budd Mfg. Co. This process is similar to spot welding, but careful control is exercised over time and current, so that the weld is confined to a small volume of metal and thin sheets may be welded so that none of the welded portion is exposed.

Stainless steel of the chrome-nickel and straight chrome grades, now beyond the novelty stage, still remains in the vanguard of alloy steel progress. Production is mounting steadily and applications are spreading as fabricators and users are educated as to its advantages and limitations. On the latter score, much remains still to be done. Some of the leading stainless producers have spent thousands of dollars to sell a certain brand name to the ultimate consumer, while forgetting what should be their primary concern—selling and educating the fabricator, warehouse and retailer on what they can do with stainless steel from the standpoint of forging, drawing, forming, welding, grinding, as well as merchandising the finished product.

Work Toward Lower Costs

Progress in finishing and fabricating methods for stainless steel has effestively lowered rosts and has resulted in many new applications. Free machining qualities have been obtained with addition of 0.20-0.30 per cent selenium and 0.10-0.16 per cent phosphorus in the 18-8 grades. Zirconium sulphide or molybdenum sulphide has improved machining qualities of the straight-chrome grades. Intercrystalline embrittlement of 18-8, once a difficulty encountered as a result of welding, has been largely eliminated with the introduction of stabilized metal and welding rod, titanium or columbium being the stabilizing agents. Producers of stainless are supplying better material by improving mill technique.

It would be difficult to compile a list of new applications of stainless steel made during the year. Undoubtedly the most general use has been in the food, beverage and chemical industries, especially in dairies. It has been estimated that 90 per cent of the processing equipment in the larger dairies is of stainless steel.

Developments of the Year

In the brewing and distilling industries, much use has been made of stainless. One company has installed stainless steel tanks for blending and rectifying liquor. Another has built a stainless steel brew kettle, reported the first of its kind. Many of the more expensive bars are stainless steel throughout.

An Ohio company supplied 1000 flash-welded stainless steel drums for shipping a beverage syrup to bottling plants.

A 60-foot fractionating tower for the distillation of fatty acids took 20 tons of stainless.

The Fels planetarium in Philadelphia and the Hayden planetarium in New York are provided with huge domes entirely lined with perforated stainless steel sheets on which images of the stars are projected.

A Chicago hotel has installed a stainless steel cooker in its kitchen, an elaborate device for continuous heating of entrees.

The Burlington Zephyr has novelty tableware of stainless steel.

A Wisconsin fabricator built what is believed to be the largest unit of its kind in the world, a yeast propagator with attemperator coils. The tank, 18 feet in diameter and 22 feet high is of stainless-clad steel. The coils comprise 1040 feet of 3-inch seamless stainless steel tubing.

Some of the largest stainless-clad steel plates ever produced were used in building a 35-foot rotary dryer for a chemical plant.

Two developments of the year which are of signal importance both from the standpoint of users and producers of alloy steel were embodied in publication of monographs on alloys of iron and tungsten, and alloys of iron and copper. These exhaustive surveys of the world's literature on these subjects were prepared under direction of the Alloys of Iron Research and the Engineering Foundation.

Expansion Program for 1934 Dominated by 4-High Mills

EXPANSION in the iron and steel industry for 1934 centered largely on equipment for the finishing end. Mills for the production of flat stock dominated the new extension programs. Mills were laid down for rolling sheets and strip. Some are of 4-high construction; a few of 2-high design.

Continuous stands in certain installations; reversing stands in other plants. But essentially all for producing hot and cold sheets, strip and black plate for tinning in coil form.

Competition dictated expenditures in this direction and this year may witness the letting of contracts for additional units for rolling wide flat material, particularly strip and breakdowns for sheet and black plate mills. Already two are contemplated.

Operates New Type Mill

A new type 4-high hot mill for rolling coiled stock—the first to be built in this country for commercial operation—was completed last year at the Indiana Harbor plant of the Youngstown Sheet & Tube Co. The unit of the single-stand Steckel reversing type has work rolls 22 inches diameter and backup rolls 44 inches diameter, all 72 inches long. Slabs are broken down to a thickness of 1 inch on a 20 x 88-inch universal mill and the resultant plate, without being reheated, passed to the reversing mill which is built with two elevated holding furnaces, one spanning the approach and one the runout table.

As the strip emerges from the rolls it enters the holding furnace and is reeled into a coil while reduction of the remaining section continues. When the rolls are reversed, conditions are duplicated on the opposite side. The installation is capable of rolling stock up to 36 inches wide down to 16 gage and has a capacity of about 20,000 tons a month. Coiled hot strip from this mill is converted to black plate for tinning on a 4-high cold mill.

A reversing hot mill of the same type but with 2-high rolls now is being built at the plant of the McLouth Steel Corp., Detroit, the latest concern to join the ranks of strip steel producers. The unit, which will deliver coils up to 40

Equipment Completed and Building in 1934

Table I

Open Hearths Completed in 1934

Company	Number of furnaces	Rated capacity, tons	Annual capacity, tons
American Steel Foundries, Granite City, Ill.	*1	30	25,000

*Stevens type

Table II

Stacks Remodeled in 1934

Company	Number or name
Bethlehem Steel Co., Sparrows Point, Md.	*"D"
Colorado Fuel & Iron Co., Pueblo, Colo.	"E"
Hamilton Coke & Iron Corp., Hamilton, O.	Hamilton
Hanna Furnace Co., Buffalo	No. 3
Interlake Iron Corp., Chicago	"A"
Republic Steel Corp., Thomas, Ala.	No. 2
Total	6

*Replacement.

Table III

By-Product Ovens Completed in 1934

Company	No. of ovens	Type of ovens	Est. annual coking capacity, tons
Illinois Steel Co., Gary, Ind.	*140	O-W	1,030,000

Type of ovens: O-W, Otto-Wilputte underfired.
*Replacement.

Table IV

Rolling Mills Completed in 1934

Company	No. mills	Type mills
American Sheet & Tin Plate Co., Gary, Ind.	*2	84" 4-high cold strip
Eastern Rolling Mill Co., Baltimore	*1	84" 4-high cold strip
Elliott Brothers Steel Co., New Castle, Pa.	*1	18" 4-high cold strip
Globe Steel Tubes Co., Milwaukee	†1	seamless
Greer Steel Co., Dover, O.	1	30" 4-high cold strip
Jones & Laughlin Steel Corp., Aliquippa, Pa.	1	42" 4-high cold strip
Otis Steel Co., Cleveland	1	30" 4-high cold strip
Otis Steel Co., Cleveland	1	18" 4-high cold strip
Pittsburgh Steel Co., Allenport, Pa.	††1	seamless
Reeves Mfg. Co., Dover, O.	1	28" hot sheet
Robertson Co., H. H., Ambridge, Pa.	†††1	13" sheet
Rotary Electric Steel Co., Detroit	1	20" 4-high cold strip
Signode Steel Strapping Co., Chicago	*1	7½" 4-high cold strip
Standard Tin Plate Co., Canonsburg, Pa.	*1	38" 4-high cold strip
United States Steel & Wire Co., Newark, N. J.	1	10" cold strip
United States Steel & Wire Co., Newark, N. J.	1	12" cold strip
Weirton Steel Co., Weirton, W. Va.	*1	38" 4-high cold strip
Wheeling Steel Corp., Yorkville, O.	1	42" 4-high cold strip
Youngstown Sheet & Tube Co., Indiana Harbor, Ind.	*1	72" 4-high hot strip
Youngstown Sheet & Tube Co., Indiana Harbor, Ind.	*1	4-high skelp
Total	21	

*Reversing type
†Foren type
††Diescher type
†††For rolling special material

Table V

Rolling Mills Building, Dec. 31, 1934

Company	No. mills	Type mills
Bethlehem Steel Co., Buffalo	††1	79" 4-high hot strip
Bethlehem Steel Co., Buffalo	††1	4-high cold strip
Bethlehem Steel Co., Sparrows Point, Md.	†††1	8" bar
Bethlehem Steel Co., Sparrows Point, Md.	1	3-high hot sheet
Carnegie Steel Co., McDonald, O.	1	42" 4-high hot strip
Crucible Steel Co. of America, Jersey City, N.J.	*1	8½" 4-high cold strip
Ford Motor Co., Dearborn, Mich.	1	44" blooming
Ford Motor Co., Dearborn, Mich.	1	56" 4-high hot strip
Ford Motor Co., Dearborn, Mich.	*1	84" 4-high cold strip
Ford Motor Co., Dearborn, Mich.	1	4-high cold strip
Great Lakes Steel Corp., Detroit	††1	56" 4-high hot strip
Great Lakes Steel Corp., Detroit	††1	56" 4-high cold strip
Illinois Steel Co., Gary, Ind.	**1	36" hot strip
McLouth Steel Corp., Detroit	*1	20" 2-high hot strip
Thomas Steel Co., Warren, O.	1	24" 4-high cold strip
Washburn Wire Co., Phillipsdale, R. I.	1	34" blooming
Washburn Wire Co., Phillipsdale, R. I.	1	12" hot strip
West Leechburg Steel Co., Leechburg, Pa.	*1	20" 4-high cold strip
Youngstown Sheet & Tube Co., Campbell, O.	1	79" 4-high hot strip
Youngstown Sheet & Tube Co., Campbell, O.	1	84" 4-high cold strip
Youngstown Sheet & Tube Co., Campbell, O.	1	4-high cold strip
Total	15	

*Reversing type
**Replaces 28" 2-high hot strip
†Contemplated
††Relocated

diameter rolls, 20 inches long. Should conditions warrant the mill can be altered to produce wider stock.

Of the thirteen 4-high cold mills completed last year three are being used for the production of sheets—two by the American Sheet & Tin Plate Co. and one by the Eastern Rolling Mill Co. Two single stands are employed by the Jones & Laughlin Steel Corp. and the Standard Tin Plate Co., and a 5-stand tandem mill by the Wheeling Steel Corp., for rolling plack plate in coil form. The remaining 4-high units are used for cold rolling strip by the Elliott Brothers Steel Co., Greer Steel Co., Otis Steel Co., Rotary Electric Steel Co., Signode Steel Strapping Co., and the Weirton Steel Co.

Table VI

Recapitulation

	Completed 1934	Building 1934
Open-hearth	1	0
Stacks remodeled	6	0
By-Product coke ovens	*140	0
Rolling mills:		
Blooming	0	2
Seamless	2	0
Sheet, 2-high hot	1	0
Sheet, 2-high cold	1	0
Sheet, 3-high hot	0	1
Skelp, 4-high	1	0
Strip, 2-high hot	0	2
Strip, 2-high cold	2	0
Strip, 4-high hot	1	3
Strip, 4-high cold	13	7
Total	21	15

*Replacement

No new coke ovens, blast furnaces or open hearths were added to present capacity last year although replacements in all three of these departments were made, as indicated in the accompanying table of equipment completed and building for 1934.

Programs of construction completed or now in process of completion by various companies follow:

Youngstown Sheet & Tube Co.

CAMPBELL WORKS

Completed

Open Hearth: Two hot metal mixer cars for hauling hot metal to Hubbard plant, or for replacing mixer operation when necessary. New hot metal scales.

Miscellaneous: Converted former pump house into a wash house.

Underway

Blooming Mill: One 7-hole battery one-way fired soaking pits and one circular pit.

Strip Mill: Complete 79-inch hot strip mill for rolling hot strip and plates within range of mill; finishing equipment for handling coiled strip and sheared breakdowns; and, plate finishing equipment consisting of levelers, shears, trimmers, normalizing and pickling equipment, etc.

Complete cold rolling mill consisting of continuous pickler, one 3-stand 4-high tandem cold mill, two single stands 4-high mills, shears, coilers, levelers, pilers, trimmers and annealing equipment.

Miscellaneous: Tools and testing equipment for more perfect threads.

STRUTHERS WORKS

Completed

Merchant Mill: Installed straightener for flats, angles, and hexagons. Drinking water system. Two railroad spike machines complete with charging skids, furnaces, etc.

Rod and Wire Department: Two normalizing furnaces.

Miscellaneous: Single track railroad between Struthers and Campbell plants for intracompany hauling.

INDIANA HARBOR WORKS

Completed

Blooming Mill: One 4-hole battery of one-way fired soaking pits. Extended slab piler for handling 15-foot slabs.

Skelp Mill: One 4-high reversing mill in back of 30-inch skelp mill, and equipped each side of mill for rolling hot coiled material.

Merchant Mills: Extended billet yard, and shipping end, and relocated chipping dock. One car-type furnace for annealing alloy bars.

Tin Mill: Cold roll department for rolling tin plate from hot coiled strip. This included extension to tin mill buildings, pickling and coiling equipment, one 4-high reversing mill, uncoiling and cleaning equipment, shears, pilers, and one annealing furnace. Ventilation system in assorting room and warehouse.

Tube Mill: Equipment and instruments for improving threads.

Tie Plate Department: Complete tie plate unit with furnaces, combination punches and shears, and shop equipment.

Miscellaneous: Building and equipment of metallurgical and chemical laboratory for handling alloy steel.

INDIANA HARBOR WORKS

Underway

Tin Mill: Sprinkler system for fire protection.

SOUTH CHICAGO WORKS

Completed

Coke Plant: Dust prevention equipment in screening station. Electric precipitator for final cleaning blast furnace gas for underfiring coke ovens.

United States Steel Corp.

CARNEGIE STEEL CO.

Completed

Schoen Steel Wheel Works: Fabricating equipment for I-Beam-Lok, new type flooring for bridges, etc.

Underway

McDonald Works: One 42-inch 4-high strip mill with auxiliary facilities.

ILLINOIS STEEL CO.

Underway

Gary Works: Converting 28-inch 2-high strip mill into a 36-inch 4-high strip mill, including additions to and improving auxiliary facilities.

Rebuilding two batteries coke ovens.

AMERICAN STEEL AND WIRE CO.

Completed

Worcester, South Works: New soaking pit building and eight 6-ingot pits, to be heated by oil.

AMERICAN SHEET AND TIN PLATE CO.

Completed

Gary Sheet Mill: Two 4-high reversing cold reduction mills, tempering pass cold mill and auxiliary finishing and shearing facilities.

Underway

Gary Sheet Mill: Continuous pickling equipment for hot rolled strip, including new building.

Gary Tin Mill: Additional slab heating furnace and improvements to continuous roughing mill.

Republic Steel Corp.

Completed

Youngstown District: New welding unit of larger capacity in No. 1 electric weld tube mill.

Forming and sizing equipment for No. 2 electric weld tube mill rearranged and improved for high-grade casing.

In finishing end of electric weld tube mill a normalizing furnace, additional cut-off machines and an upsetting machine.

Warren District: Cleaning system including flying shear in cold strip department.

Copper plating equipment.

Central Alloy District: Billet chipping machine and a tube type annealing furnace.

Buffalo District: No. 6 open-hearth furnace rebuilt to improve design.

Motor-driven blast furnace blower.

Die roll finishing department enlarged.

Chicago District: Equipment for producing railroad spikes.

Heat treating furnace.

Two new billet furnaces of larger capacity for 12-inch mill.

Birmingham District: No. 2 blast furnace relined and rebuilt.

Upson Nut Division: New bolt and nut machines, also new threading machine of improved design are being installed.

Union Drawn Steel Co.: Wire

(*Please turn to Page* 258)

Table VII

Blast Furnaces Dismantled in 1934

Company	Name of stack
American Rolling Mill Co., Ironton, O.	Belfont
American Rolling Mill Co., Ironton, O.	Sarah
Birmingham-Trussville Iron Co., Trussville, Ala.	Trussville
National Steel Corp., Buffalo (Hamburg St.)	"A", "B" and "C"
Republic Steel Corp., Thomas, Ala.	Pioneer No. 3
Virginia Iron, Coal & Coke Co., Max Meadows, Va.	Max Meadows
Total	8

New Steels Play Big Role As Railroads Modernize

RAILROADS in 1934 formally initiated a movement for increased freight rates and extended co-operation to Co-ordinator Eastman in lining up his program for unifying the control of all forms of transportation, but while awaiting concrete results they applied the principle of self-help.

Through a start at rehabilitation of their rolling stock, both freight and passenger, they undertook direct measures to regain much of the passenger traffic they have been losing to the highways and airways, and to become more flexible and expeditious in the handling of freight.

Costs Are Heavily Increased

Their costs advanced upward of $200,000,000 annually by two new burdens—increased costs of materials and supplies due to NRA and restoration of the greater portion of the 1932 pay reduction (the remaining 5 per cent to be restored next April 1)—the railroads went to the interstate commerce commission for $170,000,000 additional revenue.

To Ask Unified Transport Control

For iron and steel, in the main, they proposed an advance of 10 per cent on finished products, with a maximum of 2 cents per 100 pounds. Their application, in September, was followed by hearings which are shortly to be concluded. In no rate case in recent years has interest been so low. Washington has been guessing that the ICC will ask the carriers to wait until remedies, such as Eastman unification, have a chance to operate.

Perhaps in his initial message to congress, perhaps at some later date, the President is expected to submit legislation formulated by Mr. Eastman and designed to give the ICC control over all transportation except air, and to place that under a federal commission to govern development of it for two years. The opposition from motor truck interests indicates the feeling such a move would redound to the benefit of the railroads.

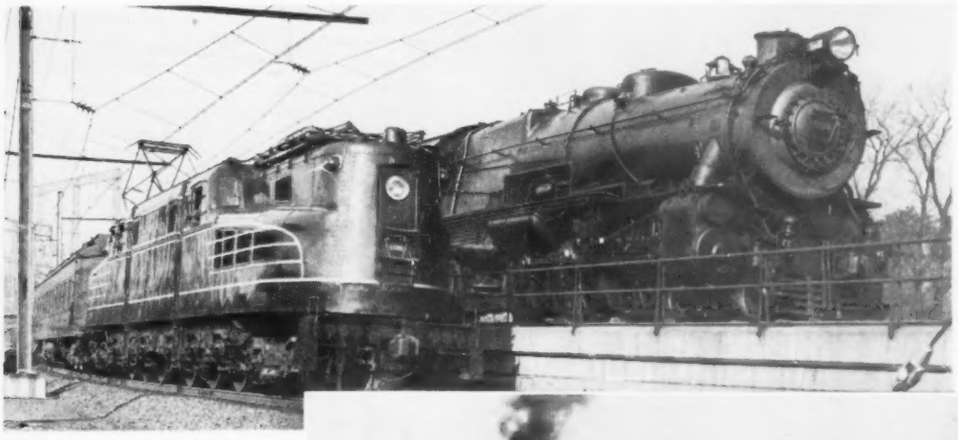
But most spectacular, from the standpoint of the general public, in transportation in 1934 was the impulse toward streamlining. Doubtless some of the early streamlined trains have been built for their publicity value, yet they hint at a vast and fundamental change in railroad rolling stock. Certainly, an interest has been kindled, and the railroads are not "through."

Change Is Fundamental

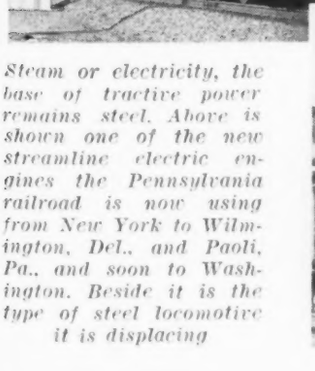
TODAY, at the threshold of 1935, this redesign problem is indeed imposing. Basically, it goes back farther than dressing up a few passenger trains and it is more fundamental than front paging the record time of a streamlined passenger train's transcontinental run. Where it comes to rest is in a virgin field, among the freight cars of the country's railroads, among the 2,000,000-odd freight revenue units that are the carriers' bread-and-butter and that by sheer numbers displace passenger cars by a ratio of 40 to 1.

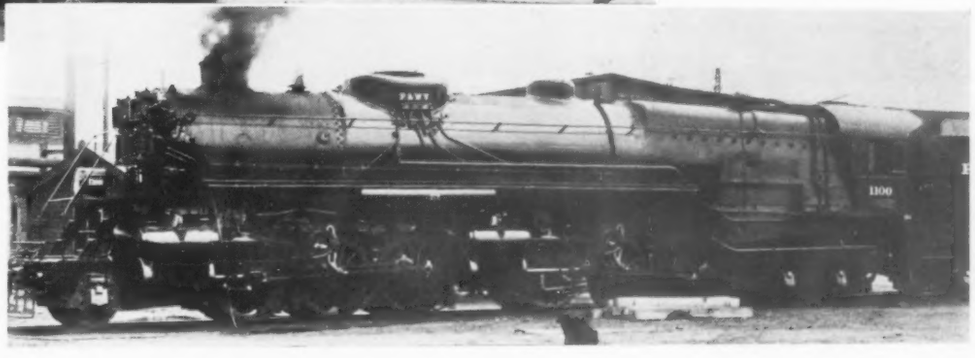
Replacements Loom Large

This vast unscratched field is where the steel industry now casts an eye. Over the past ten years, on the average of about 90,000 of the 2,000,000 freight cars have been replaced annually. But, because of slack replacement in the early thirties, the share for replacement in 1935 and some years thereafter has



Iron and steel, rolled and cast, to a total of 406 tons was used in this steam locomotive (below) recently delivered to the Pittsburgh & West Virginia railroad by the Baldwin Locomotive Works, Eddystone, Pa. It is 108 feet long, carries 20,000 gallons of water and 20 tons of coal, and was financed by PWA. Photo courtesy of Pittsburgh Press





Steam or electricity, the base of tractive power remains steel. Above is shown one of the new streamline electric engines the Pennsylvania railroad is now using from New York to Wilmington, Del., and Paoli, Pa., and soon to Washington. Beside it is the type of steel locomotive it is displacing

jumped to an estimated 200,000 cars annually. Counting on a conservative average of 10 to 15 tons of steel per car, the steel industry's stake is some 2,000,000 to 3,000,000 tons annually, on this basis, for some few years.

First, new freight car designs and new freight car materials must demonstrate their practicability. At present, there is no clear-cut evidence that the railroads can solve their troubles by adopting lightweight freight cars, especially in view of declining payloads, just as there is no inclusive case for those that say, "the American box car is the same design as the one that hauled Grant's and Lee's armies in the Civil War—it must be radically changed."

Therefore, it must not be deduced that the carriers will suddenly throw over tradition and quickly adopt whatever new is offered. To consider all angles, it must be acknowledged that there are two schools of thought today on the problem of rolling stock redesign. One, or a combination of both, must prove itself before this experimentation comes to pass in an inclusive rehabilitation of replacement.

Material Costs Double

One group reasons thus: If the railroads are to go into replacing existing freight cars with lighter steels, or aluminum, first off, a cost of something over twice their present car material costs must be conceded. At the same time, the weight of the present 160,000-pound car cannot possibly be slashed in two to accommodate this increased material cost. It must be admitted at the outset that the new light-weight steel railroad car will cost considerably more than a simple dollar-for-dollar replacement.

Therefore, considering present conditions as transient and always with the hope in the background that something approaching 1926-1929 volume of freight traffic may return, will it repay the railroads to repair existing heavier steel cars made of carbon or copper-bearing steel with a current investment on the average of between $200 and $300 per car (and thereby perpetuate this design of car) or will it pay them to completely reinvest? At this point, it is apropos to comment that the number of disabled freight cars is at a record high.

But, the other trend of thought argues back that not only the use of new lightweight materials is imperative for future car construction, but also present railroad car appearance must be scrapped. Says J. R. Turney, director of transportation service:

"The ideal freight car is one light enough to carry 5 times its own weight; strong enough to drag 1000 times its weight; versatile enough to handle any commodity in any weather or temperature; insulated, coolable and heatable; adaptable in size to present-day sales unit requirements; providing security for person and property; dependably speedy in terminals as well as on road; accessible for loading and unloading from any one of its six sides; and finally attaining both mobility and utility by being quickly and cheaply transferable from rail to highway chassis vertically, longitudinally and laterally."

This idealistic thought visualizes a flat car 40 to 50 feet long, which, being merely a chassis and without floor, would weigh about 10 tons. It would be equipped to handle two to five individual car bodies, in seven sizes, each not over two tons each in weight and interchangeable for this flat car chassis and highway vehicles. To accommodate varying types of freight the seven sizes of these containers would range from an 8 x 8 x 10-foot size to a unit 22 x 8 x 8 feet.

This ideal the railroads may attain someday. In the meantime, hoppers, of which there are roughly some 833,000 out of the country's 2,061,000 total freight cars, are the object of practically all experiment. They have been chosen over flat, box or stock cars because their bulk commodity load lends itself to a clear-cut case of potentialities in weight reduction, pay-load increase and thus reduction in the percentage of dead weight to load.

Special Steel Tried

The Baltimore & Ohio railroad early in 1934 introduced what is claimed to be the first hopper cars made of high-tensile copper chrome steel. Two cars were built, and excepting the wheels, axles, side frames and bolsters, Cor-Ten steel was used throughout. The B. & O. has also experimented with aluminum alloy hoppers.

Late last year Pressed Steel Car Co., Pittsburgh, constructed an "exhibition" hopper car made of Cor-Ten largely in the superstructure and incorporating the feature of hollow steel axles. Subsequently, the Bessemer & Lake Erie bought 100.

By using sides, hopper chutes and bottoms, bolsters and crossties, as well as rivets all made of Cor-Ten, a 15,000-pound reduction in weight was made from a similar carbon steel type car, at the same time a 15,000-pound payload capacity resulting. To get down to this weight, both side sheets and floor were made of material but 3/32-inch thick, half the conventional car plate thickness.

To cope with lading pressure, a side plate recessing or dishing was necessitated. Incidentally, the Bal-

Box Score of Materials For New Railroad Equipment

PASSENGER TRAINS

Stainless Steel

Chicago, Burlington & Quincy, one 3-car steel train completed and three similar trains on order.
Texas & Pacific, one 2-car train completed.
Pennsylvania, one 2-car train, completed.

Special Steel

Baltimore & Ohio, one 8-car Cor-Ten steel train on order.
Gulf, Mobile & Northern, two 3-car Cor-Ten steel trains on order.
Illinois Central, one 5-car Cor-Ten steel train on order.

Aluminum

Union Pacific, one 6-car and one 3-car trains completed and two 9-car trains on order.
Baltimore & Ohio, one 8-car train on order; under-frame Cor-Ten steel.
New Haven, one 3-car train on order.

LOCOMOTIVES

(Employing special and stainless steel and aluminum alloy in various parts).
New York Central, one steam-type streamlined.
Boston & Maine, five streamlined steam locomotives. One in service; four on order with Lima Locomotive Works.
Norfolk Southern, two streamlined rail-motor cars.
Chicago, Milwaukee, St. Paul & Pacific, two steam-type streamlined; on order, American Locomotive Co.
Atchison, Topeka & Santa Fe, one 3600-horsepower diesel electric locomotive and three 660-horsepower diesel motor cars on order.
(Note: In addition, such carriers as the Baltimore & Ohio, Union Pacific, New Haven; Gulf, Mobile & Northern and others noted under "Passenger Trains" as having articulated streamlined trains on order, each involved new streamlined locomotives either electric, diesel motor or steam.

FREIGHT CARS

Special Steel

Bessemer & Lake Erie, 100 hoppers; on order with Pressed Steel Car Co. Pittsburgh.
Union, 13 test hoppers being built by Greenville Steel Car Co., but employing not only special steel, but stainless steel and aluminum alloy.
Chesapeake & Ohio, ten light hoppers, on order.
Baltimore & Ohio, two hoppers, built in own shops.
Pennsylvania, one test hopper built in own shops.
(Note: In addition numerous car shops have built experimental hopper, box, flat and refrigerator cars in their own shops for private test. The above list mentions a few of the more outstanding experiments in this field by private carriers. There are also numerous applications among the private carriers of special steel being used on some parts of rebuilt cars.

Aluminum

There are in use over 200 aluminum tank cars, owned and operated by various private transportation companies. In addition, some common carriers such as the Baltimore & Ohio have recently built experimental aluminum cars.

timore & Ohio Cor-Ten car sides are liberally crimped to meet the same lading problem. For this type of car, Pressed Steel Car Co. has proclaimed inherent savings to the buyer of around $220 per year, providing its design proves practical in service.

Experimentally, Greenville Steel Car Co., Greenville, Pa., has been testing 13 hoppers built for the Union railroad, a United States Steel Corp. subsidiary, although each is made of both aluminum and special steel. Stainless steel has not yet found favor in the freight car field.

With corrosive resistance foremost in mind, the Pennsylvania railroad for some time has been testing an old torn-down steel hopper on which it has reconstructed aluminum sides with a capacity load of coal, subjected to all types of atmospheric conditions. Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., has been experimenting with a 50-ton box car where Cor-Ten steel has been substituted for common steel; the same car shop recently built an experimental 40-ton refrigerator car, about half of the parts being of lightweight steels. There are similar tests by other carbuilders.

Aluminum Used Widely

The credits to aluminum in freight car construction not only have predated the newer light-weight steels, but also have found widespread use in certain applications for their corrosive-resistant qualities. Over 200 aluminum tank cars are now in use among many private car lines where oil, chemical and certain food products are being successfully transported. Some oil companies have appreciated aluminum or aluminum-covered tank cars for their heat-reflecting outer surface. In hopper cars the experience of the Alcoa Ore Co.'s ten 70-ton hoppers built of aluminum in 1931 has been highly successful regarding the handling of corrosive loads.

The carbon and copper-bearing steel advocates also have their story. They are looking askance at the thin sections the new "laboratory" freight cars are going to in their interests to reduce weight. They are skeptical of sidewall sections only 3/32-inch thick and say car unloaders or capacity payloads will cause buckling; they are skeptical of the higher costs involved just as they say any redesign may lead to the serious problem of freight car bodies shifting on the underframe.

Consider then the contributing problems entering this master problem of freight car redesign. Into the maelstrom has been thrown the shifting trend in the unit of traffic, the long overdue factor of obsolescence in present freight cars, the problems of freight-car life and corrosion and the increased costs inherent in the way out of replacement by employing lighter materials.

SOME of the locomotives plying our lines today are little better than museum pieces. Practically none of the locomotives built more than ten years ago is competent to perform the growing demand for high-speed freight service"—these quotations from a leading locomotive builder recently.

At the outset it is apparent that the problems affecting the railroad freight car have practically no bearing on locomotives. It must also be admitted that advancement in the steam locomotive has been far greater proportionately in the last two decades than in freight cars. In that time, the steam locomotive has increased its horsepower about 300 per cent, while wheel weights have increased only 50 per cent. Other than the desire to cut dead weight up to an extent, the problem ends.

A deterrent in the background which designers of railroad locomotives have before them constantly is the total weight problem. Designers might easily fall into the error of sacrificing weight, and at the same time, undermining safety. With so large a share of present running speed in momentum it is not surprising that one of the major difficulties experienced by a western railroad in its new light-weight lo-

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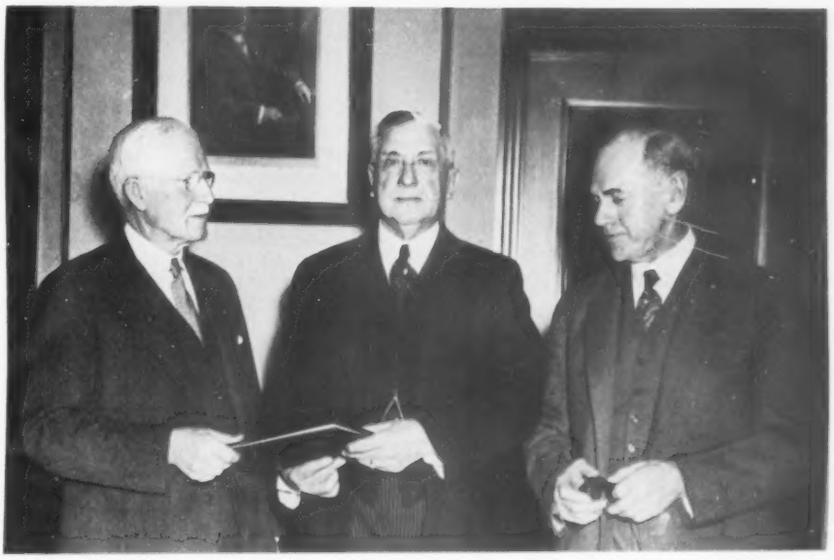
A Veteran Is Honorably Discharged



Wide World Photo

AMERICAN IRON AND STEEL INSTITUTE found time in 1934, despite the press of its duties as authority for the iron and steel code, to reorganize its personnel and internal setup.

At the general spring meeting May 24, which was the only meeting held in the year, Charles M. Schwab announced his retirement as chairman. Becoming chairman in 1927 on the death of Judge E. H. Gary, Mr. Schwab's duties as head of the Institute were doubled through the resignation of Robert P. Lamont as president on Sept. 20, 1933, to whom a successor was not immediately appointed.

Meeting on Dec. 13, directors of the institute formally accepted Mr. Schwab's resignation as chairman; abolished that office; elected Eugene G. Grace, president of the Bethlehem Steel Corp., as president; and placed a two-year limit on the tenure of president.

Above, George M. Verity, chairman of the American Rolling Mill Co., (left) is depicted tendering to Mr. Schwab (center) a memorial book of appreciation, with Mr. Grace, new president, at the right. Appropriately, the photo on the wall shows the late Judge Gary looking down approvingly. Incidentally, the only three presidents the Institute has had since its organization in 1908 have been Judge Gary, Mr. Lamont and now Mr. Grace.

At the Dec. 13 meeting Tom M. Girdler, chairman-president of the Republic Steel Corp., was elected a vice president, and Walter S. Tower continued as executive secretary.

Also during the year the institute created a technical committee with L. S. Marsh, of the Inland Steel Co., as chairman.

Pruned Back, Republic Family Tree Still Is Luxuriant

TRACING the family tree of the Republic Steel Corp. back to the sub-soil uncovers a luxuriant root growth which few other large producers of iron and steel can match, and unrolls a panorama of the industry for 120 years.

Third largest producing interest, and in the public eye at present through its proposed acquisition of the Corrigan, McKinney Steel Co. and Truscon Steel Co. and a collateral financial reorganization, Republic affords a case history of the development of the iron and steel industry in the Middle West and South. In fact, the only missing phase of the industry's growth on the entire continent is the bog iron era in the East.

Four Main Branches

As put together in December, 1929, by Cyrus S. Eaton, Cleveland capitalist whose dream of a great empire in steel was blighted by the then oncoming depression, Republic had four major components —Republic Iron & Steel Co., Central Alloy Steel Corp., Bourne-Fuller Co. and Donner Steel Co.

Even the least of these four in point of branches on its family tree—Bourne-Fuller—goes back to 1845, when James K. Polk was president, but the tap root of them all is the old Republic Iron & Steel Co. Organized in May, 1899, just at the close of the Spanish-American war, it came on the scene just as the iron age was drawing to a close.

Exclusive of coal, coke and iron ore properties, 32 separate works, as they were then termed, were merged to make the original Republic. A few were in the South, more were in western Pennsylvania and Ohio, but the majority were small works sprawling across the natural gas belt of western Ohio and southern Indiana and Illinois.

Their location tells the story—Findlay, O.; Muncie, Terre Haute, Frankton, Marion, New Albany, Brazil and Alexandria, Ind.; Springfield, East St. Louis, Belleville and Averyville, Ill., and Covington, Ky. In most, if not all, of these locations natural gas was cheap and the ideal fuel for the then crude methods of transforming muck bar and scrap into bar iron.

Even in those days there seems to have been some reservations concerning mergers, for J. M. Swank, historian and statistician for the former American Iron and Steel association, says naively in his preface to the report for 1900:

Mergers in Good Faith

"A careful examination of the contents of this volume will utterly fail to establish the truthfulness of the oft-repeated charge that there are trusts in the American iron trade. There are neither trusts nor monopolies in the iron trade of this country. Every consolidation that is described in these pages is in good faith what it pretends to be. It represents in each case a large investment of capital for the purpose of uniting in one ownership and under one management independent and often widely separated plants.

"This policy of concentration of capital and energy, which is in accordance with the industrial spirit and necessities of the age, is amply justified by the increased facilities it affords for securing economy and efficiency in management. It is not based on the prospect of securing higher prices for products or lower wages for labor, although it is certainly no offense, either in law or in morals to insist upon prices that will sufficiently recompense the capital and the labor that are employed in producing articles of necessity or convenience."

Rich in History

To develop the history of these 32 large Republic components is to dredge the deeps of the iron and steel industry and to bring up dippersfull of rich, teeming history. Many of these properties undoubtedly supplied iron for the Civil war, South as well as North. There is a tradition that iron was smelted as early as 1815—exactly 120 years ago—on the site of the present Pioneer furnaces at Thomas, Ala.

On this forge, similar to the modern blacksmith forge, with a tuyere in the center, was placed a layer of charcoal made in the nearby forest, and on top of this a layer of ore. Air forced in through the tuyere from huge bellows run by water power speeded the melting process.

The liquid metal filtering down through the charcoal formed a puddle or ball which was hammered into shape with a large hammer, also run by water power. It was a good day when 300 pounds of iron was produced; today, one of the modern furnaces of Republic will yield almost 1000 tons of iron in a day.

Of the northern properties, what went into the Republic merger of 1899 as the Atlantic furnace at New Castle, Pa., could trace an honorable history as far back as the Onondaga Iron & Nail Co. in 1838. Nearby, at Sharon, the Hall furnace could claim Boyce, Rawle & Co., formed in 1845, as an ancestor.

What is now the Brown-Bonnell works in Youngstown, probably the chief unit of the present Republic, goes back to the Youngstown Iron Works, founded in 1846, or 15 years before the Civil war. The Whiskey Island works in Cleveland, long since just a memory, dates back to 1852.

In Indiana, the C. M. Raymond Forge, destined to become part of the Muncie works, was built prior to 1870 for the purpose of producing iron direct from the ore. That iron was the equivalent of present-day steel, and in the half century that has elapsed many attempts at direct reduction of ore have been essayed, but still with no practical results.

Many Well-Known Names

There were giants in those days, too, and linked to these 32 original underlying companies of Republic were many names big both in those and succeeding days. Samuel Mather was president of Brown-Bonnell in 1894. In the same year P. D. Block was president of the Inland Works at East Chicago; S. J. Llewellyn, later to be the head of the Interstate Iron & Steel Co., which was drawn into Republic's merger of 1929, was vice president; George H. Jones, later to be identified with the Inland Steel Co., was secretary; L. E. Block, was general manager.

Buhl, a name honored in Sharon and Detroit, was identified with the Sharon works in the 80's. Edwin Thomas, who later built the Thomas Iron Co. at Hokendauqua, Pa., constructed the first Pioneer furnace at Thomas, Ala. The Indiana Forge & Rolling Mill Co., underlying the New Albany works, at one time was owned by Joseph Joseph & Co., a name prominent in scrap in Cincinnati.

H. A. Marting, who is indelibly associated with the Ironton district, at

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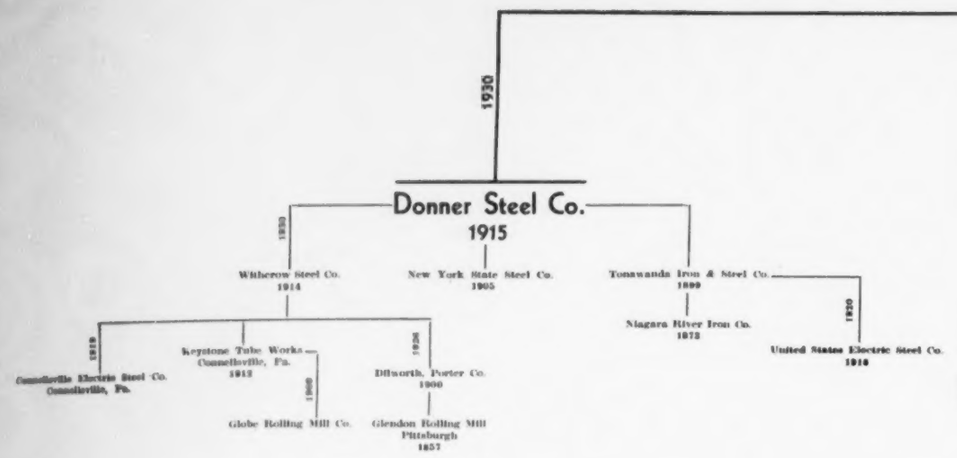
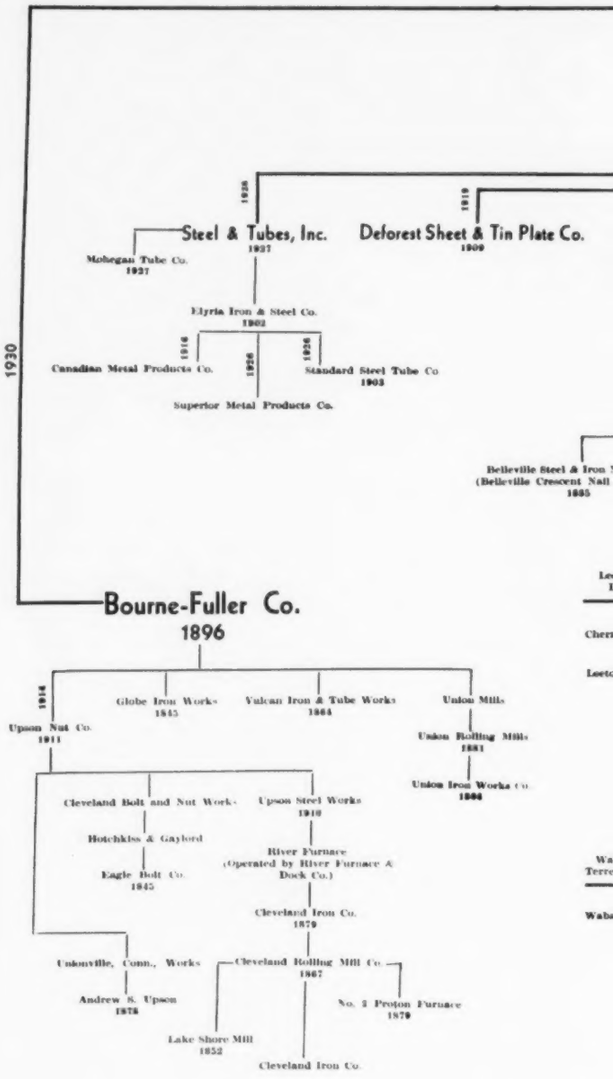
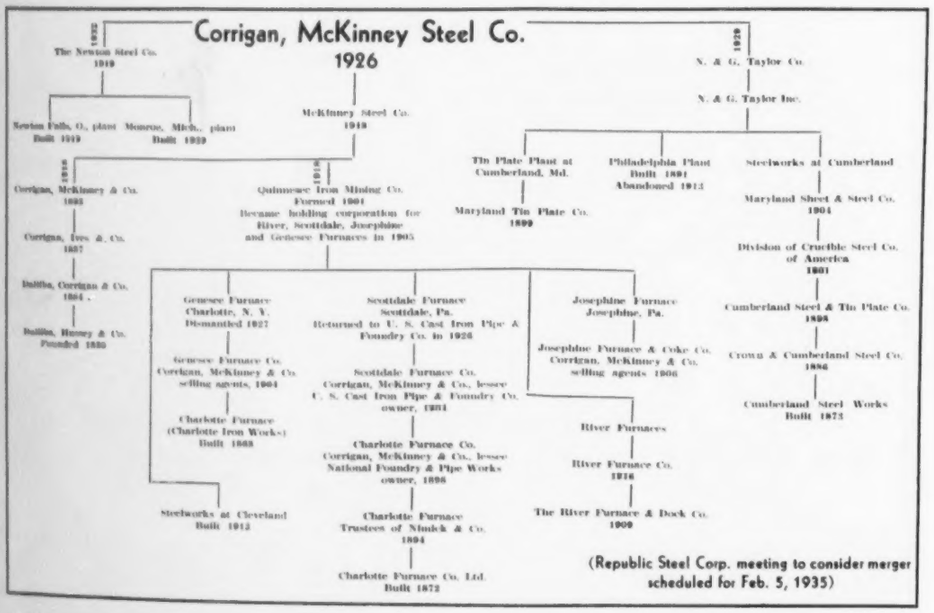






Date under company name indicates year of organization, or, where this is lacking, the first appearance of these companies in the directories of the American Iron and Steel association.

REPUBLIC STEEL CORP.

1929

1925–1928

Republic Iron & Steel Co.

1899

1899

Tin Plate Co.

Alabama Works
Gate City, Ala.

Alabama Rolling Mill Co.
1887

Alexandria Works
Alexandria, Ind.

Union Steel Co.
1893

Valley Steel Co.
1882

Belleville Steel Co.
Belleville, Ill.

elleville Steel & Iron Nail Works
elleville Crescent Nail Co., Lessee)
1885

Western Nail Co.
1882

Belleville Nail Co.

Bogy Nail Works
1869

Waugh Steel Works
1888

Atlantic Furnace and Works
New Castle, Pa.

Atlantic Iron & Steel Co.
1874

Etna Furnace
1868
(Etna Iron Works Ltd.)
1874

Etna Iron Co.
1868

Onondaga Iron & Nail Co.
1838

Toledo Works
Toledo, O.

Toledo Rolling Mill Co.

Maumee Rolling Mill
(Maumee Rolling Mill Co.)
1883

Muncie Works
Muncie, Ind.

Muncie Iron & Steel Co.
1893

Birmingham Rolling Mill Works
Birmingham, Ala.

Birmingham Rolling Mill Co.
1880

Sharon Works
Sharon, Pa.

Sharon Iron Co. Ltd.
1882

Sharon Iron & Nail Works
(Westerman Iron Co.)
1862

Central Works
Brazil, Ind.

Central Iron & Steel Co.
1882

Brazil Furnace
1867

White River Works
Muncie, Ind.

Park Iron & Steel Co.

Florence Iron & Steel Co.

White River Iron & Steel Co.

Anderson Rolling Mill Co.
Anderson, Ind.
1891

Indiana Works
Muncie, Ind.

Indiana Iron Co.
1882

Lancaster Iron Co.
Lancaster, O.
1890

Middlesex Rolling Mill
(Wheeler Iron Co.)
1873

C. M. Raymond Forge

Middlesex Furnace Co.
1850

Mahoning Valley Works and
Furnace
Youngstown, O.

Mahoning Valley Iron
1870

Hubbard Mill
(Abandoned in 1890)
(Hubbard Co-operative Iron Co.)

Hubbard Iron Co.
1872

Leetonia Works
Leetonia, O.

Cherry Valley Iron Works

Leetonia Iron & Coal Co.
1871

Hall Furnace
Sharon, Pa.

Sharon Furnace

Sharon Iron Co.

Sharon Furnace
(Boyce, Rawle & Co.)
1845

Terre Haute Works
Terre Haute, Ind.

Terre Haute Iron & Steel Co.
1894

Terre Haute Iron & Nail Works
1869

Eagle Works
Ironton, O.

Ironton Rolling Mill
(Eagle Iron & Steel Co.)
1894

New York & Ohio Iron & Steel Co.
1853

Westerman Works
Marion, Ind.

Westerman-Stewart Iron Co.
1898

Westerman Natural Gas Iron Co.

Prospect Rolling Mill Co.
1888

Wetherald Works
Frankton, Ind.

Wetherald Rolling Mill
(Wetherald Rolling Mill Co.)
1893

Wetherald Rolling Mill
Findlay, O.
1887

Inland Works
East Chicago, Ind

Inland Iron & Forge Co.
1894

East Chicago Iron & Steel Co.
1889

Corns Works
Massillon, O.

Corns Iron & Steel Co.
(Joseph Corns & Son)

Massillon Rolling Mill

Massillon Coal & Iron Co.
1873

Cleveland Works
Cleveland

Lake Erie Bolt & Nut Co.

Lake Erie Iron Works
(Lake Erie Iron Co.)
1853

Wabash Works
Terre Haute, Ind.

Wabash Iron Co.
1874

Springfield Works
Springfield, Ill.

Springfield Iron Co.
1872

Brown-Bonnell Works
Youngstown, O.

Bessemer converter from Springfield, Ill., Works in 1900
Bessemer converter and 32-inch blooming mill from Alexandria, Ind., Works in 1900

Phoenix Furnace
1854

Brown-Bonnell Iron Co.
1894

Mahoning Iron Works
1890

Brown, Bonnell & Co.
1855

Youngstown Iron Works
1848

Andrews Works and Haselton Furnace
Youngstown, O.

Haselton Iron Works
(Andrews Bros. Co.)
1886

Niles Iron Works
(Moved to Haselton in 1880)
(Andrew Bros. & Co.)
(Niles Iron Co.)
1872

Harris, Blackford & Co.
1865

Tube Works
Lansingville, O.
1900

New Albany Works
New Albany, Ind.

Indiana Forge & Rolling Mill Co.
1898

New Albany Forge
1869

New Albany Rolling Mill
1887

Pioneer Furnaces
Thomas, Ala.

Pioneer Mining & Mfg. Co.
1886

Mitchell-Transfer Works
Covington, Ky.

Mitchell, Transfer & Co.
(Ohio Valley Steel & Iron Works)
1878

Sylvan Works
Moline, Ill.

Sylvan Steel Co.
1904

Tudor Iron
1884

St. Louis Bolt &
1873

Genealogy of the Republic Steel Corp.

Excluding iron ore, coal and coke properties

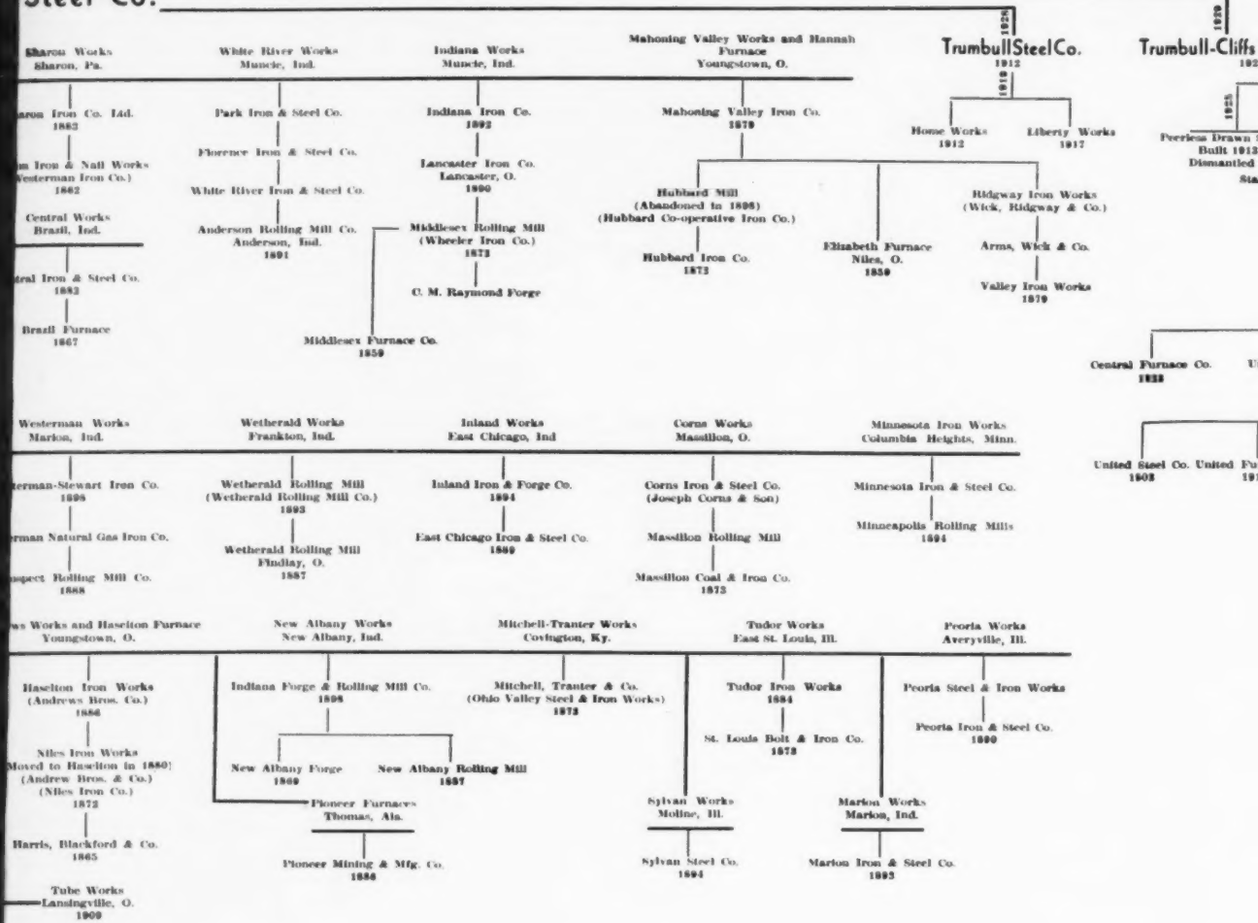
Of the works comprising the original Republic Iron & Steel Co., those now in existence are Brown-Bonnell and Haselton at Youngstown, Sylvan at Moline, the bolt works at Muncie, and the Pioneer furnaces at Thomas, Ala. The others have been abandoned.

Supplement to STEEL, Jan. 7, 1935

EL CORP.

29

Steel Co.



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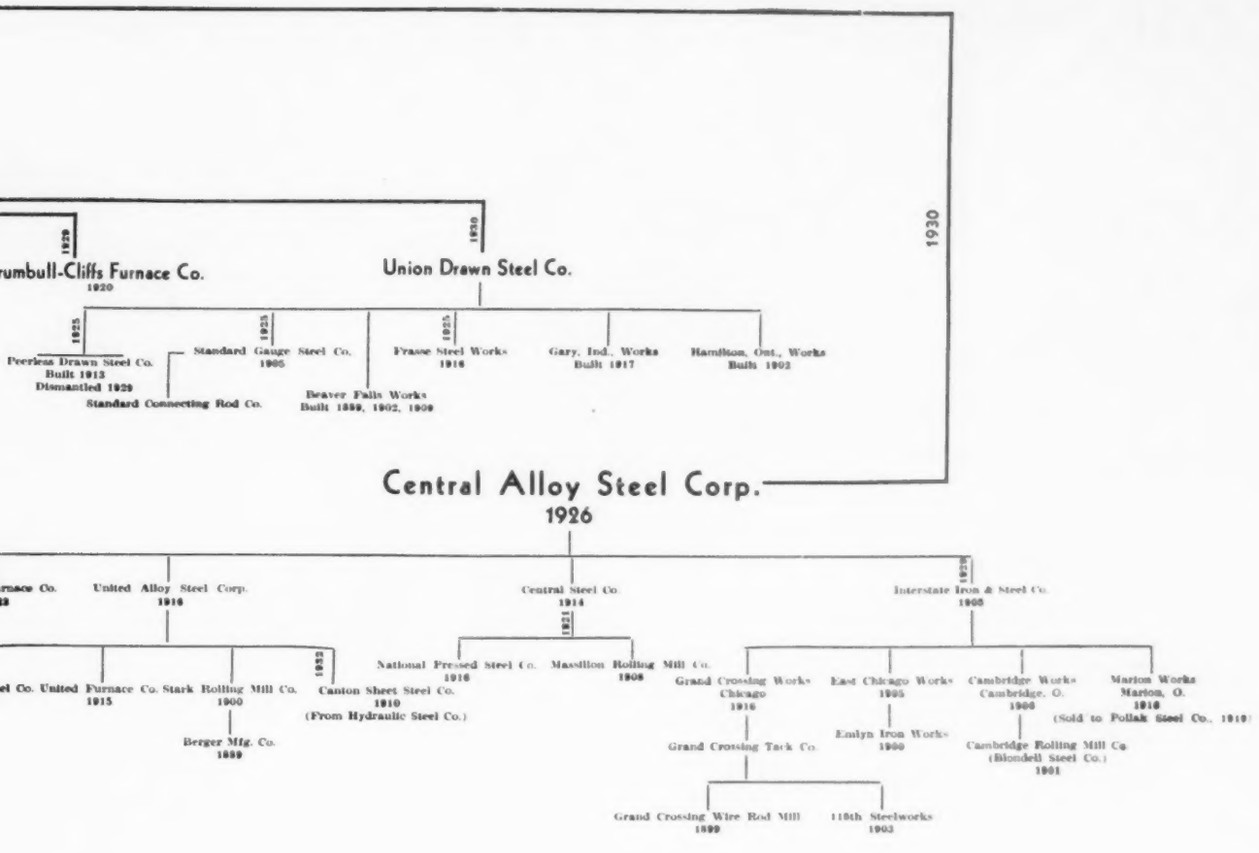

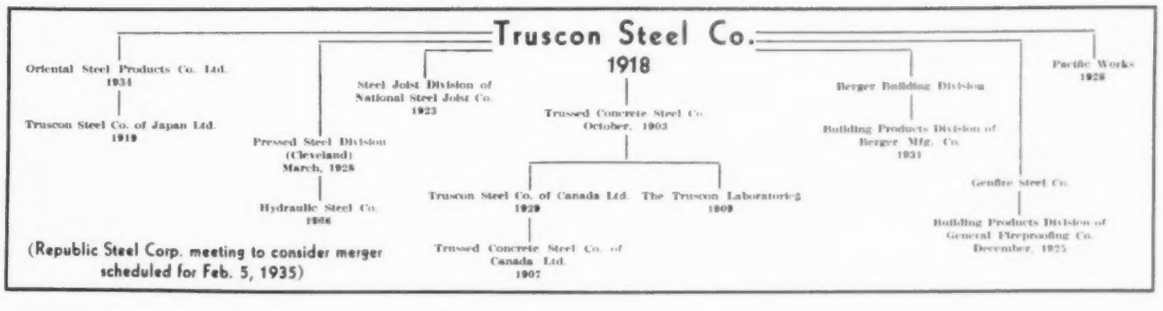

Heavy, black rules leading horizontally and vertically to the Republic Iron & Steel Co. tie in the original 32 components. All went in on the same basis. There is no priority in position; the layout is dictated by the necessity for condensation of space.

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Resigned:

Willis L. King, as vice president and member of executive committee of Jones & Laughlin Steel Corp.
George Gordon Crawford, as president of Jones & Laughlin Steel Corp.
L. C. Reis, as president of Minnesota Steel Co.
Thomas Woods, as assistant to president of Carnegie Steel Co.
Samuel R. Hoover, as sales executive of Carnegie Steel Co.
E. S. Rooney, as Cincinnati district sales manager for Youngstown Sheet & Tube Co.
Frank J. Johnson, as president of American Hoist & Derrick Co.
Charles E. Stuart, as president of Tyson Roller Bearing Corp.

Promoted:

William I. Howland Jr., to vice president in charge of sales of Illinois Steel Co., succeeding Edwin S. Mills.
F. A. Shick, to vice president of Bethlehem Steel Corp.
J. M. Larkin, to vice president of Bethlehem Steel Corp.
C. R. Holton, to vice president of Bethlehem Steel Corp.
J. V. Honeycutt, to assistant general manager of sales of Bethlehem Steel Corp.
E. E. Goodwillie, to assistant to vice president in charge of sales of Bethlehem Steel Corp.
Fred M. Fuller, to general manager of sales, American Sheet & Tin Plate Co.
H. J. Freyn, to chairman of board, Freyn Engineering Co.
C. R. Messinger, to president of Chain Belt Co.
Arthur H. Young, to vice president of United States Steel Corp.
Alexander E. Walker, to general manager of sales, Republic Steel Corp.
Norman W. Foy, to assistant general manager of sales, Republic Steel Corp.
R. G. Russell, to vice president and general manager, Cyclone Fence Co.
Arthur J. Ramsay, to vice president of Pittsburgh Rolls Corp.
Everett Chapman, to vice president of Lukenweld Inc.
Charles R. Rhodes, to assistant general manager of sales of Illinois Steel Co.
Edward R. Stettinius Jr., to vice chairman of finance committee of United States Steel Corp.
E. J. Bettendorf, to president of Bettendorf Co.
E. J. Paulus, to vice president of McClintic-Marshall Corp.
G. Walter Sanborn, to vice president of United Engineering & Foundry Co.
F. A. Lorenz, to vice president of American Steel Foundries.
Samuel E. Hackett, to president of Jones & Laughlin Steel Corp.
L. S. Hamaker, to vice president and general manager of Berger Mfg. Co.
R. S. Archer, to chief metallurgist of Republic Steel Corp. in the Chicago district.
John E. McCauley, to president of Birdsboro Steel Foundry & Machine Co.
Harold B. Ressler, to president of American Steel Warehouse association.
K. B. Bowman, to general superintendent of steel mill of Timken Steel & Tube Co.
W. J. Hanna, to district sales manager of Republic Steel Corp. at Chicago.
Snowden Samuel, to president of Frank Samuel & Co.
Ralph L. Harding, to head of iron and steel division, department of commerce.
W. T. Davidson, to manager of machine parts division of Struthers-Wells Co.
Edwin C. Stout, to sales manager of eastern district of Wickwire Spencer Steel Co.
E. A. Bateman, to partner of Bauer, Wilson & Bateman.
Howard M. Wilson, to president of Taylor-Wilson Mfg. Co.
John C. Dilworth, to manager of railroad sales of Carnegie Steel Co.
G. M. Herman, to vice president and general manager of sales of Continental Roll & Steel Foundry Co.
George A. Higgins, to assistant manager of sales at Pittsburgh of Carnegie Steel Co.
Walter H. Burr, to president, Association of Iron and Steel Electrical Engineers.
Melvin Pattison, to president-treasurer of Industrial Brownhoist Corp.
Walter J. Bothwell, to Detroit district sales manager for Jones & Laughlin Steel Corp.
Frederic Crosby, to president, American Hoist & Derrick Co.
K. C. Gardner, to vice president of United Engineering & Foundry Co.
G. G. Coolidge, to president of Harbison-Walker Refractories Co.
Chester H. Lehman, to vice president of Blaw-Knox Co.
J. E. Troyer, to president of Central States Bridge & Structural Co.
Henry F. Pope, to chairman of National Malleable & Steel Castings Co.
Carl C. Gibbs, to president of National Malleable & Steel Castings Co.

Died:

L. B. Nutting, president, Foster-Wheeler Corp., New York, Jan. 12.
Edward J. Kearney, Kearney & Trecker Corp., Milwaukee, Jan. 12.
James Hartness, former president, Jones & Lamson Machine Co., Springfield, Vt., Feb. 3.
Edward B. Elcock, president, Hansell-Elcock Co., Chicago, Feb. 12.
Frank R. Dravo, president, Dravo Contracting Co., Pittsburgh, Feb. 26.
Frederic B. Stevens, F. B. Stevens Co., Detroit, March 1.
E. A. Gibbs, vice president, McClintic-Marshall Corp., Bethlehem, Pa., March 1.
Thomas J. Gillespie, president, Lockhart Iron & Steel Co., Pittsburgh, March 12.
George M. Gillette, former president, Minneapolis Steel & Machinery Co., March 17.
Dr. Walter Rosenhain, English metallurgist, March 17.
Frederick A. Geier, pioneer Cincinnati machine tool builder, March 27.
George F. Allderdice, president, Commercial Shearing & Stamping Co. Youngstown, O., April 5.
Luther L. Knox, formerly vice president, Blaw-Knox Co., W. Pittston, April 6.
Walter D. Wood, president, R. D. Wood & Co., Philadelphia, April 20.
Samuel T. Johnston, former president, American Foundrymen's association, Chicago, April 23.
Frank Samuel, president, Frank Samuel & Co. Inc., Philadelphia, April 29.
Jonathan Warner, founder of Trumbull Steel Co., Youngstown, O., May 5.
William E. Corey, former president, United States Steel Corp., May 11.
Edwin L. Crosby, president, Detroit Electric Furnace Co., Detroit, May 5.
Taylor Allderdice, former president, National Tube Co., Pittsburgh, May 20.
Benjamin F. Mohr, formerly assistant vice president, Illinois Steel Co., Chicago, May 25.
John T. Dillon, president, Lake Erie Engineering Co., Struthers-Wells Co. and Titusville Iron Works, June 4.
Sidney R. Rectanus, vice president, American Rolling Mill Co., Middletown, O., June 22.
Llewellyn W. Jones, president, Manganese Steel Forge Co., Philadelphia, June 24.
Harry L. McCauley, Milwaukee district sales manager for Inland Steel Co., June 26.
Harry W. Tuemler, sales manager, Newport Rolling Mill Co., Newport, Ky., June 28.
L. W. Hostettler, general sales manager, Allegheny Steel Co., Brackenridge, Pa.
E. A. Peden, of Peden Co., Houston, Tex., July 10.
Louis F. Nagle, general sales manager, Central Iron & Steel Co., Harrisburg, Pa., Aug. 2.
Edwin Corning, former president, Ludlum Steel Co., Aug. 7.
Frank D. Heath, district sales manager at Detroit for Jones & Laughlin Steel Corp., Aug. 11.
William T. Shepard, formerly vice president, Rogers-Brown Iron Co., Aug. 18.
John A. Topping, former chairman, Republic Iron & Steel Co., Greenwich, Conn., Aug. 24.
Arthur A. Fowler, former president, Rogers, Brown & Co., Sept. 2.
Edward A. Langenbach, chairman, former United Alloy Steel Corp., Canton, O., Sept. 8.
James P. Roe, inventor of Roe iron puddling process, Reading, Pa., Sept. 14.
Charles B. McNaught, chairman, Dominion Steel & Coal Corp., Sydney, N. S., Sept. 16.
Dr. Calvin W. Rice, secretary, American Society of Mechanical Engineers, Oct. 2.
Kenneth I. Small, manager New York office of Chicago Bridge & Iron Works, Oct. 10.
Harry R. Sinclair, president, Worcester Stamped Metal Co., Worcester, Mass., Oct. 11.
Franklin M. Bowman, vice president, Blaw-Knox Co., Pittsburgh, Oct. 12.
Carl V. Dodge, vice president, United Engineering & Foundry Co., Pittsburgh, Oct. 16.
Frank H. Nullmeyer, superintendent, Youngstown Sheet & Tube Co., Struthers, O., Oct. 20.
David B. Oliver, former general manager, Oliver Iron & Steel Co., Pittsburgh, Oct. 21.
A. R. Williard, assistant district manager, Carnegie Steel Co., Cleveland, Nov. 3.
W. L. Clements, former president, Industrial Works, Bay City, Mich., Nov. 6.
Ralph M. Dravo, president, Dravo Contracting Co., Pittsburgh, Nov. 11.
Marcus W. Saxman, president, Latrobe Electric Steel Co., Latrobe, Pa., Nov. 20.
G. Watson French, former director, Republic Iron & Steel Co., Nov. 27.
Charles O. Bartlett, founder, C. O. Bartlett & Snow Co., Nov. 28.

Financial

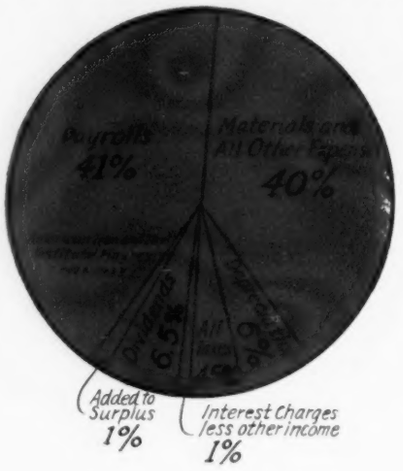
IRON and steel producers whittled down their losses in 1934 to an estimated $22,500,000. In the first quarter their deficits approximated $7,200,000, in the second quarter they made $19,500,000, in the third quarter their losses aggregated $20,000,000, while the showing for the fourth quarter probably was a loss of about $15,000,000.

Since steelmaking operations for the year averaged 37 per cent, it appears that between 45 and 50 per cent of capacity is the line of division between profit and loss.

While statistics on the capitalization of the industry for 1934 are not yet available, it is apparent that steel still is a $4,000,000,000 industry.

So far as the record shows, no large amounts of bonds were retired by any of the primary producers in 1934. There was, however, some retirement of preferred stock, as by the Ludlum Steel Co., for example. The capitalization of leading iron and steel producers, and a comparison of their earnings or deficits for the period from 1929 foreward, including the first nine months of 1934, are to be found on page 130 of this issue.

Where Steel Dollar Goes

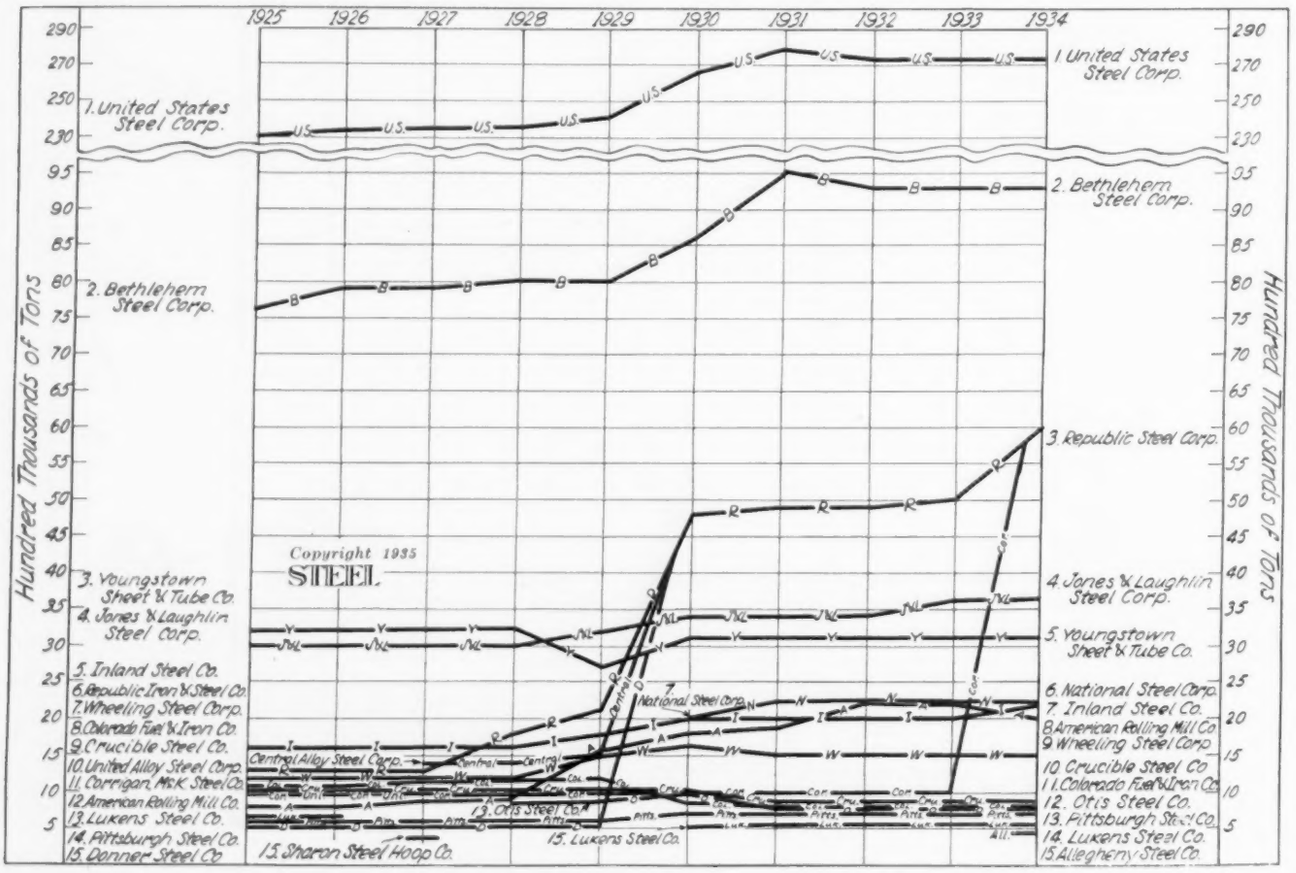


Reckoning 1930 as the first year of the depression, the industry still is on the credit side of the line. Its profits in 1930 and 1931 still leave a margin of $40,760,337 over the losses of 1932, 1933 and 1934. This balance, however, is more than offset by the losses sustained by employes in reduced income, and in other curtailments.

Following is a comparison of deficits and earnings of the entire industry for the depression period:

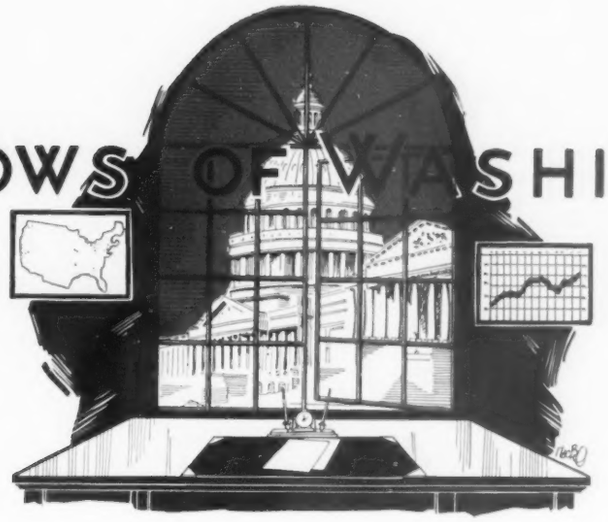
Year	Before dividends and bond interest	Capitalization
1929	$371,118,899 P	$4,003,442,316
1930	198,775,599 P	4,376,909,581
1931	17,405,647 P	4,291,515,610
1932	116,887,789 L	4,093,757,019
1933	36,033,120 L	3,979,471,108
1934	22,500,000 L	*

1934 Estimated, P=profit, L=loss.
*Not yet available.



IN THE above chart the position of the 15 leading makers of steel for the past ten years has been charted on the basis of annual capacity. During this period, the United States Steel Corp. has slightly increased its lead over Bethlehem Steel Corp., which has held second place by a wide margin. Undisputed for third place since its formation in 1930, the Republic Steel Corp. is about to tighten its hold on third place by the acquisition of the 1,000,000 tons of capacity of the Corrigan, McKinney Steel Co.; the 1934 rating of Republic gives effect to this merger. Jones & Laughlin Steel Corp. has topped the Youngstown Sheet & Tube Co. for fourth place. In the belt between an annual capacity of 500,000 and 2,200,000 tons there is much congestion. Ingot figures used in this comparison are those supplied by the companies charted for STEEL*'s annual comparison of earnings or deficits. Under the code, no new steelmaking capacity is under way*

WINDOWS OF WASHINGTON



WASHINGTON

IT WILL be well in 1935 not to appraise the situation at Washington by every single act of the administration or congress or industry or organized labor. Even an old masterpiece becomes a mere daub of paint when examined too closely. So vast is the panorama of the capital and so numerous the contending forces that only studied, discriminating judgment will impart the true perspective.

Balancing known factors for the long pull, the trend of events in Washington this year apparently will be increasingly favorable to industry, for these reasons:

Power and time make for conservatism; the administration is now half way through its term; the specter of the presidential and congressional elections in 1936 will be a restraining influence.

It is being recognized that the depression can be beaten only by solving the problem of unemployment. There is only one way to increase employment permanently, and that is through industry. The recovery doctors will have priority over the reform specialists in 1935.

Industry has become resigned to at least two, perhaps six, more years of Roosevelt, and its evident attitude of making the best of the situation and its willingness to co-operate is evoking a similar concession and mellowing from the administration.

The natural forces at work for recovery are accelerating; the tension generally is lessening; people are of a mind to work; they are hoping for a sudden boom but reconciled to a long, hard pull. The psychology is one of recovery; faith in America is being rekindled.

As employment increases, the agitation over collective bargaining will diminish; the American Federation of Labor flourishes only during times of depression; industry is making concessions that would ultimately have come anyway, and collective bargaining will be revealed as a specious issue.

Congress basically is not radical; a majority talks privately against the new deal but is mute before the personal popularity of the President; neither Long nor LaFollette are so astute as the President; they will talk themselves out of serious consideration.

This, of course, is the general pattern. Each side will win battles, but it is the war that counts, and when the smoke clears away industry will be found having gained more ground than it lost.

On the more important issues touching iron and steel, the present outlook for 1935 is:

NRA

It is more likely to be continued as a separate entity than broken up and parceled out to the federal trade commission and departments of justice and labor.

The backbone of any legislation continuing it after June 16 will be restrictions of hours, minimum rates of wages, a clarification of section 7a (collective bargaining) and possibly retention of trade practice rules. The trade commission has friends in congress, and may break off the latter jurisdiction, which it really started under Harding.

Price control (not price fixing) provisions of codes probably will be made voluntary for industry. The pressure of large producers will be for continuation of price provisions; the preference of small interests will be for relaxation, permitting them to capitalize any advantage peculiar to their position.

The day of one-man rule ended when General Johnson departed in October. The time-honored form of government, except for the departments, is by commission, and NRA will be no exception.

BASING POINTS

The federal trade commission eventually will succeed in its attempt to have steel quoted at the place of production. Against greater odds than today, a trade commission in 1923 ordered the abolition of Pittsburgh-plus, and its order was accepted by the entire industry without question.

No matter how sound the reasoning behind the present basing point system, which is infinitely broader than the one made effective ten years ago at the behest of the commission, the laymen of the government cannot understand why a product made at one point should be "based" at another.

PUBLIC UTILITIES

The crusading spirit and gusto with which the President from his early days at Albany has pursued "the power interests" insures no letup this year. The issue is easy to dramatize, and a case against any utility rates easy to make out. It is not inconceivable that eventually the network of power lines may pass to government control.

For iron and steel, the early stages of this campaign mean tonnage, as witness the tonnages of structural steel, sheet piling, reinforcing concrete bars, wire mesh and other materials awarded for the TVA, Grand Coulee and other projects. The tendency in rates will be lower. From the standpoint of pure self interest, iron and steel should benefit.

TRANSPORTATION

It is a foregone conclusion that the interstate commerce commission will not grant the railroads any increases in freight rates, in the proceeding now under way,

unless business snaps back so rapidly immediately that shippers would not notice them. And this is not probable. The commission undoubtedly will suggest that the railroads await the result of a rationalization of transportation control.

Chances are bettter than even that congress will enact some legislation unifying control of all transportation facilities except air, and the latter will be placed under a separate federal commission for the time being. This will give the railroads a "break", and will militate, on the whole, against competing highway transportation. The net effect will be to lessen the advantage of motor transportation of such bulk products as steel.

FOREIGN TRADE

On taking office in 1933 and in the first throes of the promised retrenchment, the administration drastically reduced appropriations for development of foreign trade through the bureau of foreign and domestic commerce of the department of commerce. The fact that Mr. Hoover, as secretary of commerce, greatly expanded the bureau may have contributed to the zeal to minimize it.

This passion has passed, and the tide is now toward assisting industry in selling abroad. In this there is a degree of inconsistency, for in agriculture the trend is distinctly toward a nationalistic policy, which receives impetus from artificial measures to restrict production and increase prices. But so far as iron and steel is concerned, efforts to enlarge foreign trade will be intensified. These efforts will be directed principally to Latin and South America.

SUPREME COURT

In 1935 it will pass on the constitutionality of the national industrial recovery act (the basis of NRA), railroad pension act, invalidization of the gold clause in government bonds, right of the Tennessee Valley Authority to compete with private utilities in the sale of electricity, and practically all basic phases of the new deal.

Up to now the court has been dividing 5 to 4 on the liberal side. But new dealers shivered last month when the court indicated that it frowned upon NRA writing some 10,000 pages of what has the effect of law without their being legally recorded anywhere, of some 60 different government agencies issuing executive orders, of administrative departments in general becoming lawmakers.

Following the Civil war, the court sustained the government in the greenback case on the ground an emergency existed. Probably many phases of the new deal will receive similar liberal treatment, provided the emergency does not end quickly in a big upswing.

TAXATION

No noteworthy increases are in prospect. Income tax rates probably will remain unchanged. A payroll tax of 5 per cent to finance unemployment insurance is generally discussed. Washington is talking in undertones of imposing heavy levies on corporation surpluses and reserves for depreciation, depletion and similar charges unless they are generously expended; thus far, this seems chiefly a threat. Really serious efforts to balance the budget will not be attempted until the fiscal year 1937, after the elections of 1936.

A study is being made of the entire tax structure and some moves may be made to end overlapping levies. A typical example is gasoline, which in some localities bears a federal, state and local tax. The net effect on the total of taxation would be minor.

A Primer on Housing

by Federal Housing Administration

BELIEVING that housing offers more possibilities to the iron and steel industry than any of the other stimulants now being tried by Washington, STEEL asked the housing administration for a summary of facts depicting the extent of this market.

FHA is anxious to loan money for repairs or new house construction, practically to the extent of the sum required. Even minor repairs trace back to some need for iron and steel. For a low-cost steelframe house, the requirement is estimated at 2 to 4 tons.

Following are the facts, succinctly stated, some developed by FHA and some culled by it from outside sources:

29,000,000 houses in the United States.

16,500,000 need repairs, of which 12,663,000 need minor repairs and 3,000,000 major repairs.

$1,600,000,000 estimated as sum required to put the country back into good physical condition.

Houses of the United States represent 16.5 per cent of the total wealth, or $70,000,000,000 in 1929.

Lands on which dwellings stand, including farms, represent 29.4 per cent of the total wealth, or $125,000,000,000.

Over 12 per cent of the national income in 1928 was spent for shelter ($11,000,000,000 out of $89,000,000,000).

Employes in construction industry in 1929 totaled 4,426,944, of which 2,576,791 were in building construction 858,927 in residential construction).

One-third of 4,000,000 families on relief are identified with the building trades.

74 cents of each dollar spent in building goes to labor: 36.4 cents to labor on job, 21 to labor in factory, mill or with dealers, 7 cents to labor at source of material, 4 cents to labor in transportation and 5.6 cents to office estimating, general supervision and engineering.

50,000 or fewer houses built in 1933, and probably the same in 1934. 300,000 to 400,000 were built in Great Britain in each year with government aid.

$300,000 spent in 1933 for dwelling construction, or 10 per cent of normal in pre-depression years. 5,000,000 is accumulated total of new houses needed; 1,600,000 is immediate minimum.

Building costs are now 13 per cent below the 1926 level, after rising 15 per cent.

Rents are 35 per cent below 1926, after rising 5 per cent.

Out of every 100 farm houses, 50 are under minimum standards of livability, 15 need new foundations, 15 to 20 new roofs, 10 to 15 new floors, 10 new walls.

29 per cent of all urban dwellings have no bathtubs, 72 per cent no central heating, 38 per cent no hot water facilities, 36 per cent cook without gas or electricity.

Mortgages on urban real estate total $21,000,000,000.

89.3 per cent of people live in single family houses, 6.9 in apartment houses, 3.8 in flats.

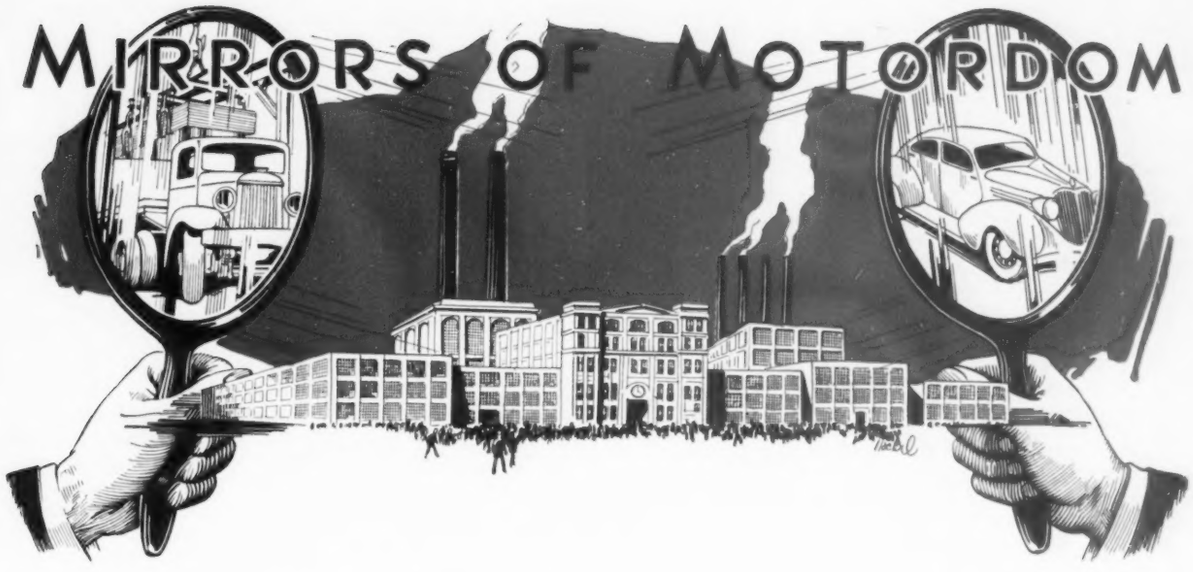
New dwelling construction in past 10 years: 87.7 per cent single houses, 8.5 per cent apartment houses.

Since 1929 corporations have put aside $4,000,000,000 a year for depreciation, spending little. They have $10,000,000,000 which could be used for repair and replacement. ("If industry would spend $1,000,000,000 a year on buildings alone, as it should, and others followed suit we would have prosperity in 90 days."—James H. Moffett, FHA administrator.)

"America's factories need $8,000,000,000 in new machinery and $3,000,000,000 in electrical equipment before they can be really up to the minute."—Harwood F. Merrill in an article in *Forbes Magazine*.

The housing market: $1,000,000,000 for paint and varnish, 3,000,000 new roofs, 10,000,000 electric refrigerators, 8,000,000 electric signs, 4,000,000 washing machines.

Real property survey in 42 cities shows 68.9 per cent of structures are used for dwelling purposes not counting hotels, 15.2 are two-family structures, 11.3 per cent are apartments or three to four-family structures, 4.6 per cent are flats above stores, etc.



DETROIT

AS THE bellwether of a gradually receding depression, the automotive industry in 1934 contributed more than its usual share to the recovery effected in steel output compared with previous years.

Similarly, products of the steel industry were responsible in no small degree for improvements in motor car design which helped the industry attain its largest production in four years.

Passenger cars and trucks built in the United States last year numbered 2,700,000 to 2,800,000 units, an increase of more than 40 per cent over 1933, while total steel production was rising slightly over 12 per cent. Compared with 1932, the nadir of the depression, automotive operations nearly doubled and steel output rose about 90 per cent.

START OF 1934 IS BEST

For both industries 1934 was the most active year since 1930. Automobiles made a better showing than steel, compared with the later year however, the decreases being about 19 and 35 per cent, respectively.

In contrast to the situation in 1933, motor car builders experienced their best activity last year during the first and second quarters, several months of which witnessed production more than double that of the corresponding periods the year before. Activity in late summer and early fall declined below the 1933 level, however.

Labor troubles spasmodically harassed the industry, first with a strike of tool and die workers late in 1933, which delayed several interests in expanding assemblies during January and February of 1934, and later with the threat of a general strike among production workers.

Higher costs resulting from advances in wages and in commodity prices brought less satisfactory profits for most manufacturers and continued losses for some in comparison with 1933 despite the larger volume of sales.

The tendency toward greater use of steel in automobile construction continued last year, one of the principal developments being the metal roof adopted by several interests for 1935 models.

NEW ROOFS LIFT STEEL USE

Several years ago steel use was extended to all exterior parts except a middle section of the roof where a soft fabric covering was retained because a way had not been found to eliminate the rumble incident to solid construction. Overcoming this difficulty enabled designers to introduce a body completely steel sheathed.

General Motors, adopting the steel top for its various models, employs a single stamping for both roof and curved sides. In other cases a steel sheet welded in place merely has been substituted for the fabric section.

Availability of wide sheets capable of taking the desired draw has aided the development of streamlining. In some instances, the back slope of the body has been given a continuous sweep that is not interrupted by any molding.

Spring suspension and streamlining, the two principal talking points in automotive design in 1934, are being carried over into this year as moot subjects. Knee-action coil springs, sponsored by General Motors, precipitated a more or less general use of some type of independent springing as optional or standard equipment last year, although Ford continued to use its transverse leaf spring arrangement.

MOLYBDENUM GETS CALL

Silicomanganese alloy steel first was adopted for the knee action springs. Later Chrysler developed a carbon-molybdenum steel which it used for coil springs, retaining the same specifications for leaf springs which it has substituted for the coil type on most of its 1935 units.

While independent coil springs worked out well in practice, the expense of their manufacture was somewhat of a burden on the manufacturer of low-price cars. Even General Motors found it desirable to put a solid axle and conventional springs on its cheapest series of Chevrolet cars, while in 1935 one line of Pontiacs will be similarly equipped.

Plymouth and Dodge cars, in going back to leaf springs, are given softer suspension through the thin leaves of the carbon-molybdenum steel. Molybdenum alloy steels of other types also are coming to the front as evidenced by their adoption for various moving parts on models now being

Automobile Production

Passenger Cars and Trucks—U. S. Only

By Department of Commerce

	1932	1933	1934
Jan.	119,344	128,825	156,907
Feb.	117,418	105,447	231,707
March	118,959	115,272	331,263
April	148,326	176,432	354,745
May	184,295	214,411	331,652
June	183,106	249,727	308,065
July	109,143	229,357	266,576
Aug.	90,325	232,855	234,810
Sept.	84,150	191,800	168,171
Oct.	48,702	134,683	132,491
Nov.	59,557	60,683	78,415
Dec.	107,353	80,565	.....
Year	1,370,678	1,920,057	2,595,502*

*11 Months.

introduced. Cheaper than certain other types of alloys, molybdenum steels frequently give equal, or nearly the same, physical characteristics, so that a further increase in use of this material as an alloying element in steel is forecast.

Steel tubing is replacing the conventional forging for the front axle of some new models.

Tied up closely with spring suspension in the attainment of a smooth ride is the subject of engine and seat location. That it has been found desirable on many new models to relocate both forward of their former positions, mounting the engine over the front axle and the rear seat of sedan bodies ahead of the back axle, is indicative of the importance of this factor.

Effecting a similarity of vibration frequencies between front and rear springs by the changed weight distribution has done considerable to improve riding qualities, and whereas a year ago the status of the leaf spring for front end use appeared jeopardized, it has strengthened its position materially since that time.

It is noteworthy in this connection that Ford, long champion of the leaf spring, has redistributed the weight of new cars and moved the front spring ahead of the axle in making more effective use of this suspension.

NARROW RADIATORS WIN

Streamlining of automobiles was given considerable impetus last year by the Chrysler and DeSoto airflow models. These cars achieved moderate popularity, and although their reception indicated that public taste was not wholly won over to all appearance features, it will be noted that other manufacturers now have adopted a rear end body design similar to that of the airflow style. Front end treatment has veered more to the narrow radiator grille than to the blunt type, however.

Important trends in various other car features last year included the swing from mechanical to hydraulic brakes, with increased use of alloy steel for brake drums, and the adoption of pressed steel artillery wheels by some manufacturers in preference to the wire spoke type. Wheel diameters continued to be reduced in lowering the center of gravity.

Freewheeling's popularity waned and was dropped as standard equipment from some cars, while the overdrive transmission rose in esteem.

The move toward use of an automatic gearshift became slightly more pronounced, while an improved system of body ventilation became firmly introduced. Adjustable shock absorbers, regulated from the dashboard and one of the talking points of a few years ago, found few supporters.

The trend toward increased popularity of low-priced cars, apparent throughout the depression, was not lessened last year by betterment in general business conditions but was heightened by engineering improvements incorporated in the cheaper, small cars. Sales of the highest-price vehicles were smaller than during 1933 or 1932. Emphasis on development of business in the popular class field is indicated by the addition of new series in that market for 1935. Manufacturers which will feature cheaper cars in addition to more expensive models this year include Pontiac, DeSoto, Reo, Graham, Chevrolet, Packard and Lincoln.

"BIG THREE" DOMINATE

From a sales standpoint, Ford's comeback last year was noteworthy. While again trailing Chevrolet in registration of both passenger cars and trucks, Ford was ahead in passenger car sales after being nearly 40 per cent behind its principal competitor in 1933. Plymouth continued to occupy third place.

Incomplete figures on registrations indicate that Chevrolet, Ford and Plymouth accounted for about 73 per cent of all cars sold, against slightly under 70 per cent in 1933. Similar data show little change from 1933 in percentage of business taken by the Big Three—Chrysler, Ford and General Motors—this group accounting for somewhat more than 90 per cent of total registrations.

Headed by Ford, several automobile manufacturers made extensive investments in new plant facilities.

Ford's $20,000,000 program, started last year, included building of new hot and cold strip mills, in addition to the purchase of considerable metalworking, foundry and other equipment.

Packard invested $6,500,000 in equipment and facilities in connection with the introduction of a new series of cars, while Oldsmobile spent $2,500,000 in doubling its capacity.

Pontiac carried out the most extensive retooling program since its plant was built six years ago. Fisher body plant at Pontiac installed 15 new presses, several of which are the largest ever employed.

Completion of Ford's steel mill building program will eliminate considerable business in flat rolled material from the open market, though capacity will be insufficient for peak requirements.

Several of the small independent manufacturers found the pinch of competition heightened by the uniformity of wage and material costs resulting from NRA codes and financial reports in this group invariably were poor though slightly better than in 1933.

Truck manufacturers fared better than passenger car builders last year, production being consistently ahead of 1933. A gain of around 70 per cent was shown for the 12 months, which were the best since 1929. Sales to the government were a contributing factor to this spurt.

Attempts were made, partly through governmental instigation, to eliminate the sharp swings in automobile production during the year, but little tangible progress was made despite announced intentions of General Motors to stagger introduction of its various models in 1935.

Practically all companies prepared to show new cars in late December or early January, and steelmakers and parts suppliers the past few weeks have been rushed to meet heavy demands of car builders.

Labor

(*Concluded from Page* 111)

pension plans underwritten by the insurance companies apply to companies which employ 1000 workers or less, although these represent only 17 per cent of all annuity-insured employes. Among the larger companies are leaders in oil, public utility, food and banking fields. Many have what is called "the package plan" providing in one policy for life, health and accident insurance, as well as annuities.

The carriers report $9,000,000,000 worth of group insurance—all types—outstanding, including $8,200,000,000 life insurance, $744,000,000 accidental death; $16,000,000 accident and health; $8,500,000 for monthly retirement incomes.

Industry's pensioners—both insured and uninsured—are drawing about $100,000,000 annually, though they constitute only a minor fraction of the superannuated.

Already plans are prepared for presentation to congress to provide a gigantic federal system. One of the most conservative—that suggested by the National Conference on Social Security—would cost $29,400,000 a month, the insured person contributing 42 cents a week. The Townsend plan proposes a noncontributory dole of $2,000,000,000 a month.

Perhaps the same depression, which magnifies the need for pensions, may interfere with everyone's ability — including Uncle Sam — to contribute. Pensions like savings, need to be nurtured in prosperous times.

Exports at Peacetime High As Scrap Goes International

A LUSTY trade infant of the depression—the exportation of iron and steel scrap—mushroomed foreign trade of the United States in iron and steel in 1934 to the highest level since the World war. By a wide margin, it featured the entire export and import situation.

Superficially, scrap appears to be a simple object of trade. Easily collected, not requiring tender handling, sufficiently devoid of the time element to make it a desirable return cargo, it would seem to involve few complications.

The fact is, its ramifications almost have become a national issue. Steel producers as far inland as Pittsburgh have felt the buying for export and have seen their markets rising in price. Jingoists and nationalists imbued with varying degrees of patriotism cloak scrap with warlike possibilities and regard each shipload as the passing of an irreplacable natural resource—which in a way it is.

Scrap Superior to Ore

To review briefly, what has occurred the past few years is this: Foreign countries, chief of which has been Japan, have foraged the world over for scrap, an important ingredient in their steelmaking, and eagerly sought after in its advantages of low cost plus high iron content. Many foreign iron ores, and especially so in Japan, are of low iron content. Foreign exchange has abetted these foreign countries coming to the United States to purchase such material.

In their efforts to glean scrap, these buyers led by Japan, Poland, Italy and Czechoslovakia, have found a bonanza on the eastern seaboard of the United States. Here existed a payload vein—vast holdings privately and in scrap dealers' hands—of all kinds of industrial and railroad scrap iron. Since 1931, American steel mills because of their slack operations, were rapidly viewing these growing supplies as a drug on the market.

Steamers, mainly small tramp bottoms, arriving at eastern ports of the United States with sugar and other shipments originating in the Far East, were ideal carriers for the returning scrap consignment. Otherwise, many of these hulls would have returned empty.

Furthermore, it was found by the Japanese that good melting grades of scrap could be purchased on barges at New York, shipped all water to Japan and laid down alongside the furnaces for $9 to $10 a ton. Though this price has since advanced, nonetheless in 1932, when the export movement started to take on imposing size, scrap could be purchased in the American eastern market for around $6 a ton. Additional charges of $3 a ton usually covered shipment and other charges amply.

In the main, the scrap which has been exported from this country has been dealer accumulations which have been rounded up through the East in small individual lots, collected on barges and transshipped to ocean-going steamers. Fully one in every four tons exported has been loaded at New York or Brooklyn, N. Y.

Only a few large scrapping programs have been carried on for eventual export, but among those outstanding have been those of the Florida East Coast, Seaboard and Southern railroads. It is also interesting to note that obsolete United States government destroyers at the Philadelphia navy yard were recently sold for breaking-up, and obsolete shells from Fort Stevens, Oregon, were also consigned as scrap to Japan. War alarmists have played up these latter two circumstances.

Exports Are Quadrupled

With such a trade continuing, 781,349 tons of scrap were shipped out of the United States in 1933. For 1934 the total will be over 1,850,000 tons. Five years ago, in 1929, there was only 557,044 tons exported, and in years prior the movement had been even more modest.

Now the jingoists shout that Japan is laying in a three-years' supply of war-making materials. One Pittsburgh daily newspaper recently ran a lengthy story on this subject and wound up by succinctly stating, "Scrap is used to make shrapnel."

One of the members of congress promises to seek action in January to prevent the sale of old ships for breaking-up in foreign countries on the grounds of being unpatriotic. The fear of Japan and others robbing the United States of a steelmaking requisite has

The scowload of scrap shown at the right, apparently mostly from junked autos, is being loaded in the upper photograph into a tramp steamer for Japan. It may be melted down immediately or it may go into the 3-year supply Nippon is laying in

been kindled in the hearts of practically every layman.

The other side contends that the movement of almost 2,000,000 tons of scrap from this country annually is not injurious to our steelmaking reserves, pointing out that there is an estimated total of nearly 800,000,000 tons of steel in use in existing bridges, buildings, railroads, etc., today.

Annually, a share of this total becomes obsolete, is wrecked and so finds its way to the scrap pile. But 2,000,000 tons is far from an imposing share of the total that the scrap industry takes yearly; furthermore, there have been no exports of iron ore in this movement.

This same defensive argument points out how much labor has been employed the past three years in this export trade and how many scrap dealers have survived on this business who otherwise would have failed.

Actually, the truth is somewhere between the two contentions. Facts presented by both sides are in part colored. It is safe to state that exports of scrap to Japan, Italy, Poland or other nations has not yet reached alarmingly large proportions. Neither is the export of scrap any more harmful to this country's steelmaking reserves than the shipment of a like tonnage of finished steel products.

Doubtless, importers of scrap iron and steel are preparing themselves for war. In more ways than importing scrap has this been evident. Considering attendant circumstances, it would be folly to gloss over the truth and deny that all of the present scrap being imported for melting was being used for peacetime purposes.

Actually, though, only a percentage of the total is being accumulated for wartime needs, a percentage estimated at considerably under 50. However, Japan has been drawing scrap from other countries than the United States, some shipments having come from such countries as Australia.

Japan, for example, has been inquiring for several round tonnage lots of bars and small shapes, indicating home and industrial rehabilitation following the recent Osaka earthquake. This, in turn, indicates several Japanese steelworks' normal output was taken out of the market.

Furthermore, Japan has been expanding in Manchuria with new rail lines, buildings, etc.

Two Decades of Foreign Trade in Iron and Steel

	Gross Tons	
	Imports	Exports
1915	282,398	3,534,262
1916	310,873	6,047,646
1917	323,692	6,443,763
1918	168,264	5,338,019
1919	322,264	4,397,295
1920	360,474	4,949,436
1921	117,105	2,156,818
1922	723,914	2,000,061
1923	734,734	2,009,141
1924	556,281	1,805,064
1925	943,240	1,762,571
1926	1,111,090	2,167,048
1927	750,467	2,180,969
1928	782,694	2,862,997
1929	739,004	3,032,352
1930	537,491	1,981,985
1931	421,108	968,996
1932	378,282	594,691
1933	414,790	1,350,692
1934*	297,053	2,550,109

*Eleven months.

Mergers

FROM the standpoint of mergers, 1934 was a barren year. Republic Steel Corp., Cleveland and Youngstown, O., made the most ambitious attempt, proposing on Aug. 27 to acquire the Corrigan, McKinney Steel Co., Cleveland, and the Truscon Steel Co., Youngstown. At the same time, Republic undertook to adjust its financial structure.

Stockholders' meetings scheduled first for Oct. 30 and then for Dec. 15 were postponed to Feb. 5, 1935. Several suits questioning the amount of the fee to be paid financial houses for their services were filed. In January, Republic bought 15,909 common shares of the Gulf States Steel Co., Birmingham, Ala., as a further step toward a working agreement, but this was not consummated.

On Jan. 18, the American Rolling Mill Co., Middletown, O., purchased the Belfont Steel & Wire Co., Ironton, O., at receiver's sale. Other amalgamations during 1934 included:

Worthington Pump & Machinery Corp., Harrison, N. J., and the Carbondale Machine Co., Carbondale, Pa., merged their refrigerator interests under the name of the Carbondale Machine Corp., transferring manufacture to the Worthington plant at Harrison.

Minneapolis-Honeywell Regulator Co., Minneapolis, and Brown Instrument Co., Philadelphia, consolidated, each company continuing separate.

Austin Mfg. Co., Harvey, Ill., and Western Wheeled Scraper Co., Aurora, Ill., went together as the Western-Austin Co., Aurora.

Robins Conveying Belt Co., New York, took over the coal and ore handling business of the Mead-Morrison Mfg. Co., Chicago.

How the Depression Has Reacted Financially on the Iron and Steel Industry

Black Face Figures Denote Profit; Light Face Figures Indicate Deficit

Figures for 1934 are after charges; those for 1929-33 are before dividends and bond interest, from STEEL'S annual surveys

Annual Steel Ingot Capacity Gross Tons	Capitalization		Nine Months 1934	1933	1932	1931	1930	1929
27,341,900	$1,962,366,650	United States Steel Corp.	$11,466,000	$31,336,670	$65,862,244	**$18,507,765**	**$110,061,667**	**$205,420,451**
9,360,000	621,960,789	Bethlehem Steel Corp.	**139,473**	2,003,672	12,507,451	**7,541,784**	**31,015,923**	**53,460,160**
5,013,000	243,434,410	Republic Steel Corp.	2,193,157	660,047	7,763,109	5,442,075	**269,840**	(not yet formed)
3,660,000	173,896,193	Jones & Laughlin Steel Corp.	2,864,499	4,971,096	7,458,266	1,770,074	**9,646,302**	**21,443,454**
3,120,000	196,341,877	Youngstown Sheet & Tube Co.	1,668,633	3,881,105	9,508,883	2,677,328	**10,695,455**	**25,208,314**
2,232,000	142,298,045	National Steel Corp.	**4,582,896**	**4,555,631**	**3,699,520**	**6,559,176**	**9,219,662**	(not yet formed)
2,200,000	95,957,876	American Rolling Mill Co.	**1,453,919**	**1,471,604**	**210,800**	779,406	**1,999,530**	**7,688,602**
2,000,000	93,898,163	Inland Steel Co.	**3,108,258**	**2,141,468**	1,437,708	**3,126,600**	**7,792,717**	**13,042,124**
1,500,000	98,625,169	Wheeling Steel Corp.	**145,390**	**1,164,139**	1,720,144	1,660,470	**4,388,016**	**9,615,968**
875,000	105,781,344	Crucible Steel Co. of America	**712,034****	**413,349**	2,949,033	1,339,435	**4,541,650**	**8,364,426**
840,000	47,404,807	Colorado Fuel & Iron Co.	**194,625**	1,450,461	2,644,099	1,752,173	**1,922,723**	**3,978,236**
830,000	27,961,712	Otis Steel Co.	**570,290**	790,931	2,110,894	849,121	**1,607,026**	**4,903,392**
720,000	49,180,601	Pittsburgh Steel Co.‡	1,330,390	1,720,004	1,833,387	1,066,626	**2,377,804**	**5,132,865**
550,000	10,413,378	Lukens Steel Co.*	†	275,466	746,683	106,556	**432,506**	**1,030,617**
482,000	18,510,797	Allegheny Steel Co.	**625,701**	**292,017**	1,052,080	**50,228**	**1,610,292**	**3,311,493**
450,000	19,960,982	Sharon Steel Hoop Co.	**436,671****	**37,745**	1,703,108	1,083,419	436,190	**2,846,958**
400,500	26,930,034	Gulf States Steel Co.	13,571	**500,592**	318,078	658,539	489,902	**1,518,291**
360,000	9,006,955	Granite City Steel Co.	**153,931**	**505,652**	**13,827**	**332,319**	**700,716**	**1,682,691**
280,000	11,273,418	Continental Steel Corp.‡	**624,500**	21,739	143,187	277,119	120,120	**1,102,264**
257,400	15,312,225	Midvale Co.	†	**28,349**	245,782	**750,116**	**1,403,728**	**1,368,033**
250,800	5,661,107	Laclede Steel Co.	†	4,837	74,582	**148,417**	**451,578**	**918,882**
150,000	20,540,065	Wickwire Spencer Steel Co.	297,859	395,998	1,090,179	††	††	††
120,000	6,602,500	Scullin Steel Co.	†	609,325	575,993	††	††	††
90,000	10,773,427	Follansbee Bros. Co.	399,852	530,823	910,149	849,992	451,970	**1,514,639**
62,100	6,097,569	Vanadium Alloys Steel Co.†	**293,280****	147,494	326,745	306,551	**775,485**	**1,277,219**
38,000	6,685,822	Ludlum Steel Co.	**442,436**	**161,063**	**474,311**	99,144	443,697	**919,531**

‡Fiscal year ends June 30. *Fiscal year ends Oct. 20. †Report available on annual basis only. **Half year, 1934, only ††Annual reports not available.

AN INNOVATION IN THE IRON ORE FIELDS: Stacker erected by M. A. Hanna Co. at Mesabi Chief concentrator, Keewatin, Minn. The structural steel framework has a belt conveyor, and can be swung in a wide circumference, enabling the plant to stack ore when direct shipment is not wanted, tending to continuity in production

Iron Ore Producers Win First Important Tax Victory; Fight On

LAKE SUPERIOR iron ore producers won one important battle and lost another last year in their struggle to have mines assessed on a basis comparable with other property. Success came in court; the reverse, before the state tax commission.

The tax issue remains the most formidable problem in the industry, overshadowing for the present, at least, the farmer-labor party's platform declaration for socialization of mines.

Three circuit judges granted an 18 per cent reduction in assessments for 1932 on mines in St. Louis county, which embraces most of the Mesabi range, and all of the Vermilion. Tax payments were due in 1933, and some mining companies defaulted. The law required the state to proceed against the delinquents in 1934. The court held the mines were over-assessed. A considerable portion of 1933 taxes still are at issue.

In the meantime, the tax commission proceeded last November to fix the valuations for 1934. Practically all mining companies joined in petitioning the commission to reduce assessments 18 per cent. They had the court's decision as a strong argument, but the commissioners ruled against them, giving as an excuse the fact the state had appealed from the circuit court to the state supreme court.

The valuations on iron ore reserves for 1934, as determined by the commission, amount to $200,000,000. This is based on an estimate of one billion tons of ore in the ground in St. Louis county, at half—20 cents a ton—of the estimated market value per ton, 40 cents. A reduction of 18 per cent would have meant $36,000,000 deducted from the assessments. By comparison, taxes on buildings and equipment are negligible.

ROAST IRON ORE: As a step in concentrating, lean jig tailings are heated in this furnace to 500 degrees Cent. The ore is brought in contact with reducing gases and converted to magnetite. Quenched in water, it is then ready for magnetic separation. This plant with capacity for 250 tons of ore per day produces a concentrate assaying 63 per cent Fe. Constructed by University of Minnesota's mine experiment station and Butler Bros., at Nashwauk, Minn.

Iron Ore Ratio Diminishing

FIFTEEN years ago 1.19 tons of lake iron ore was used for every ton of iron and steel (merchant iron, plus steel ingots and castings) made in the United States. The latest figure shows a ratio of 0.72. Ore producers attribute the reduction to the greater use of scrap. Comparisons follow:

Year	Lake Ore Consumed	Ratio To Iron and Steel
1919	48,905,969	1.19
1920	57,153,886	1.14
1921	25,832,215	1.12
1922	40,975,775	1.00
1923	62,295,386	1.16
1924	45,978,221	1.02
1925	54,767,112	1.03
1926	58,359,015	1.03
1927	52,932,630	1.00
1928	56,823,322	0.97
1929	63,662,346	0.99
1930	45,192,180	0.97
1931	24,114,753	0.82
1932	10,283,520	0.68
1933	18,115,760	0.72
1934	*22,000,000	.....

*Estimated

EDITORIAL

Industry Better Prepared To Play Cards as Dealt

IN 1935, as in 1934, industrial executives will find that their responsibilities to owners, employes, customers and the public interest will entail unusual consideration of the relations between private business and the administration of the federal government.

Thanks to the experience of the past year, the main issues are more clearly defined than they were at the end of 1933. From inauguration day in March, 1933, to the end of that year, so many of the new deal policies still were in the blue print or experimental state that lines of intelligent approval or protest had not been drawn clearly. In 1934—the year in which these policies were first put to a real test—the division of opinion as to their merit formed quickly, became more intensified almost daily and progressed to a point in the final four months of the year where practically every leader in government and in industry realized that further open warfare would be futile—that both sides must compose their differences so that the fight for recovery could be waged more effectively.

Two valuable assets are being derived from the attempts to develop a more harmonious working arrangement. First, and extremely important from the standpoint of industry, is the more pronounced determination among enterprising executives to push ahead regardless of artificial restraints. To put it another way, industrial leaders realize that experiment, ill-advised legislation, unnecessarily harsh restriction, annoying meddling and political buncombe are concomitant to this period, and today they are determined that instead of using up much of their energy protesting against these difficulties they will do the best they can in spite of them. This determination to make the most of a poor hand will be a major factor in industry's drive for recovery in 1935.

Government Administration and Industry Are Moving Toward Better Understanding

The second asset is the as yet intangible growth of understanding between the leaders of industry and the key men of the government administration. At times, when a Washington spokesman makes a statement particularly obnoxious to industry, one wonders whether the advisers of the President have even the slightest appreciation of the importance of the well being of industry to the cause of national recovery. Nevertheless, these outbursts are much less frequent than they were six months ago. Moreover, in many respects the revamping of NRA and the reorganization of other new deal agencies are tending toward practical rather than theoretical or radical lines.

Every reform government the world has ever seen has turned toward the conservative side after an initial, carefree fling at radicalism. The present Washington administration is no exception to the rule. Responsibility breeds understanding, and understanding induces the employment of tried methods after the pursuit of visionary theories has failed.

Leaders of industry also understand the situation more thoroughly. Traditionally inept at politics, industrial executives were slow to grasp the play of intrigue, the bartering of favors and the miscellaneous hocus-pocus which are part of government administration in a democracy. Today they are disposed to make certain allowances for this political byplay and to shape their actions accordingly.

Remaining Differences Are of Method and of Timing Rather Than of Objectives

Thus groping for a better basis of understanding, both sides have learned that their major differences are of method and not of objective. We doubt if any new dealer is more anxious for recovery, for solution of the unemployment problem, or for the wider distribution of the advantages of comfortable living to worthy persons than are the executives of industry. The divergence of opinion arises in the methods by which these desires may be fulfilled. New dealers think the government can bring overnight reforms by legislation. Industry believes that these reforms are won by hard earned economic progress—the same force which carried the United States to the front rank among the nations of the world.

Time, of course, will prove that industry's view of method is correct. Time also will show—probably in 10 to 30 years—that some of the new dealers' objectives are attainable.

But for 1935, the immediate problem will be one of synchronizing the force of natural economic recovery with the pressure for extravagant reform. In this task, the federal administration will be compelled more and more to adopt industry's ideas to ward off impractical demands by congress.

Industry will be better prepared to play the cards as they are dealt.

THE BUSINESS TREND

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Pent-up Demand, Determination To Go Ahead Important Factors in 1935

SIX attempts at recovery have been witnessed since the crash of 1929. The first, in 1930, collapsed in a few months in the face of world wide political and financial disturbances. The second, in 1931, progressed encouragingly for five months and then failed for reasons similar to those in the previous year. The third—a modest rise from the low point of July, 1932, was slowed by election uncertainties and was engulfed in the bank crisis of February, 1933.

The fourth was the spectacular spurt from April to July, 1933, which carried the index of industrial production to a peak of 100. This rise, caused largely by the expectation of higher prices, was followed by a sharp recession.

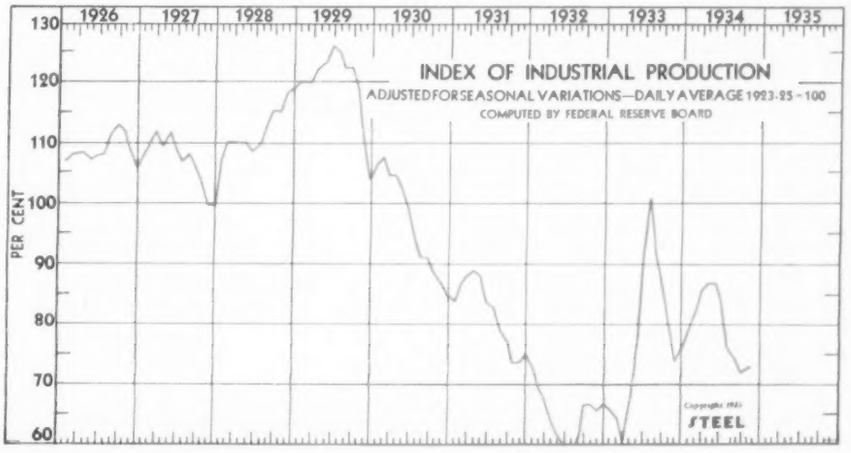
The fifth attempt began in December, 1933, and carried through to May, 1934, after which business declined precipitately to a low in September. In comparison with the recovery drive of 1933, that of the spring of 1934 was less spectacular, but its base was broader and its benefits were more widely distributed. While the 1933 rise was highly artificial and inflationary, and its end the inevitable sequence to a too rapid expansion, the improvement of 1934 was based largely upon increased natural demand and its life was terminated by adjustments necessitated by NIRA and other restrictive influences.

In the sixth attempt, which began in September and was gaining stride rapidly in December, the momentum has been and doubtless will continue to be furnished more by the effects of an accumulated deficiency in purchases than by governmental inspired artificialities. The marked change in the philosophy of industry from an attitude of confusion over uncertainty to that of determination to go ahead in spite of unnecessarily imposed difficulties was the business highlight of 1934, and will be an important factor in 1935.

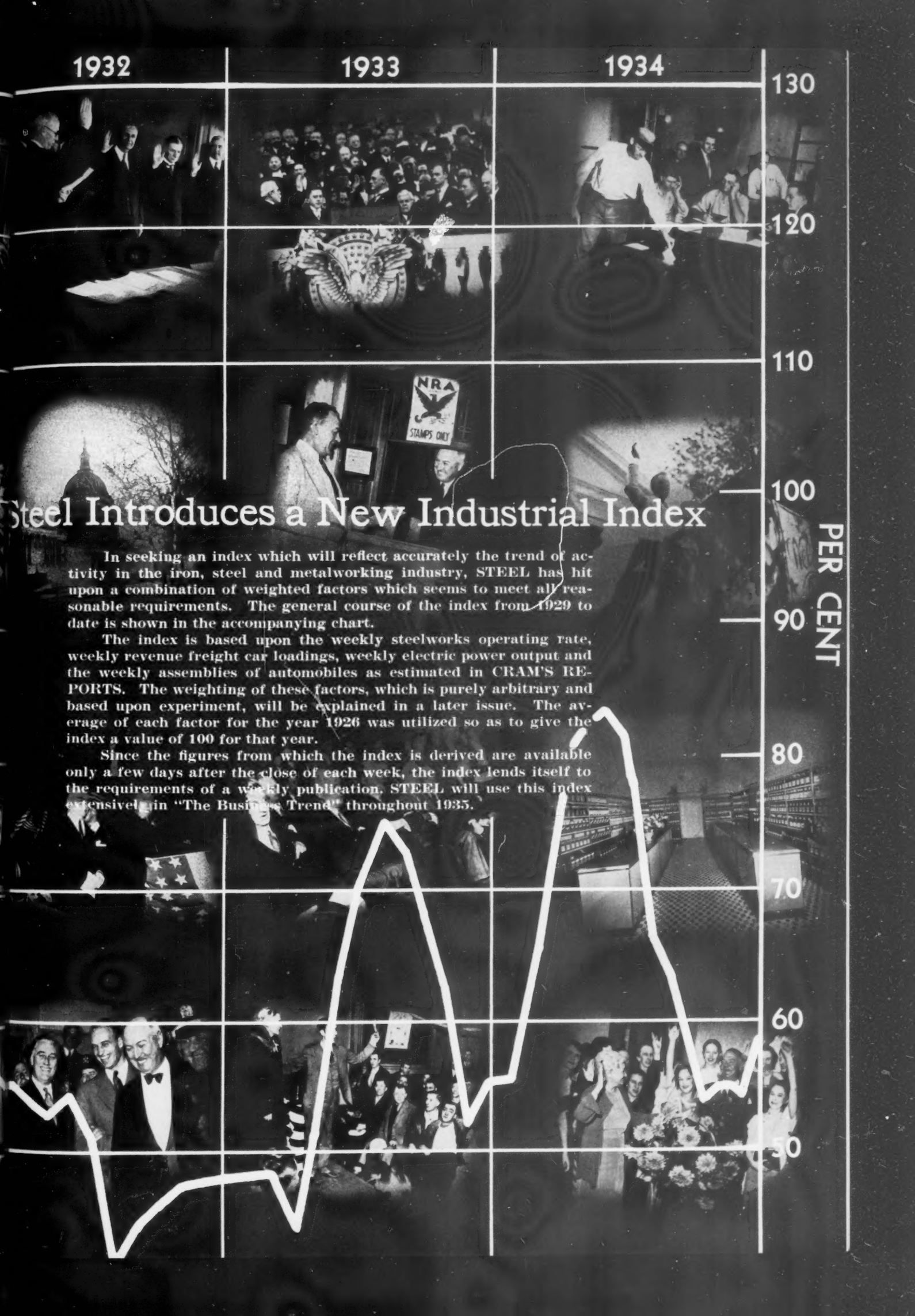
Index of Industrial Production Rising Slowly from Fall Low

Index numbers computed by the Federal Reserve Board. Average 1923-25 = 100. *Adjusted for seasonal fluctuations*

	1934	1933	1932	1931	1930
Jan.	78	65	72	82	106
Feb.	81	63	69	86	107
March	84	60	67	88	104
April	85	66	63	90	104
May	86	78	60	87	102
June	83	92	59	84	98
July	76	100	58	83	93
Aug.	73	91	60	80	90
Sept.	71	84	66	76	90
Oct.	73	76	67	73	88
Nov.	74	72	65	73	86
Dec.	75	66	74	84	



1929
1930
1931
130
120
110
100
90
80
70
60
50
PER CENT



Steel Introduces a New Industrial Index

In seeking an index which will reflect accurately the trend of activity in the iron, steel and metalworking industry, STEEL has hit upon a combination of weighted factors which seems to meet all reasonable requirements. The general course of the index from 1929 to date is shown in the accompanying chart.

The index is based upon the weekly steelworks operating rate, weekly revenue freight car loadings, weekly electric power output and the weekly assemblies of automobiles as estimated in CRAM'S REPORTS. The weighting of these factors, which is purely arbitrary and based upon experiment, will be explained in a later issue. The average of each factor for the year 1926 was utilized so as to give the index a value of 100 for that year.

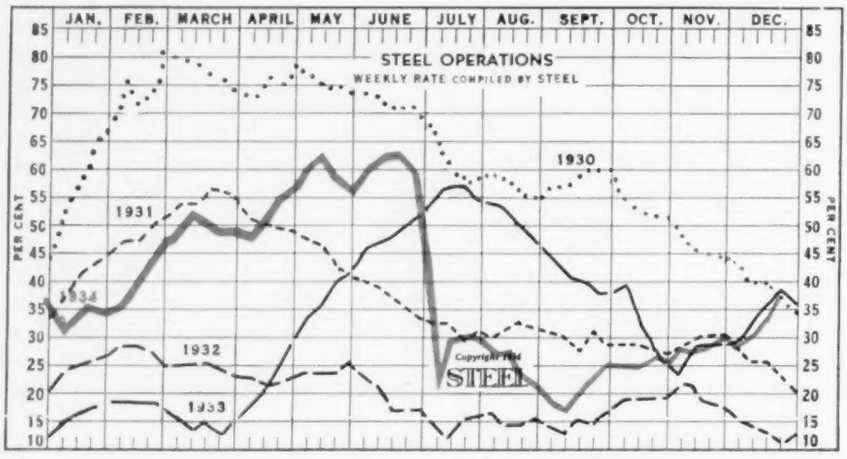
Since the figures from which the index is derived are available only a few days after the close of each week, the index lends itself to the requirements of a weekly publication. STEEL will use this index extensively in "The Business Trend" throughout 1935.

Weekly Trend Lines for 1934 Follow Pattern of 1931 Closely

MANY charts of industrial activity for 1934 resemble the pattern of trends of 1931 quite closely. The only important difference is found in the final month. In 1931, the lines on many charts turned downward in December; in 1934 the barometers were strong at year-end.

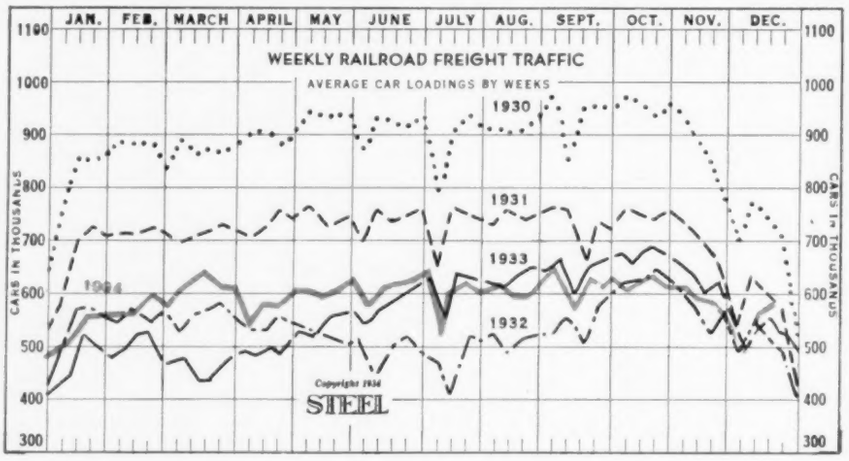
With this exception, the patterns of charts of freight car loadings for the two years are strikingly similar. Again, the similarity is even more pronounced in the trends of electric power output. Here the volumes, as well as the trends, are closely parallel.

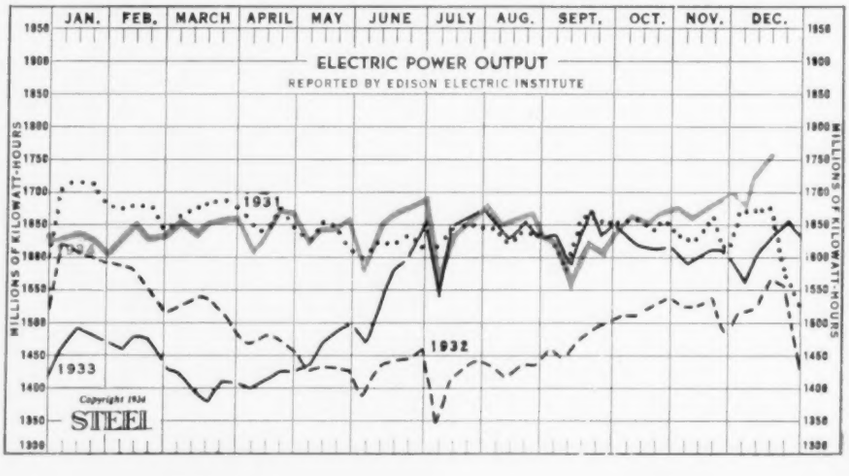
The patterns of steel operations for 1931 and 1934 are similar except in the second quarter. Remove the influence of NIRA from 1934 and the curve would have corresponded more closely.



For week ended:	Steelwks. Operating Rate (per cent)	Freight Car Loadings (cars)	Electric Power Output (1000 kw.-hrs.)
Sept. 8	18	562,730	1,564,867
Sept. 15	20½	645,986	1,663,683
Sept. 22	22½	643,120	1,630,947
Sept. 29	25	644,647	1,648,976
Oct. 6	25	631,318	1,659,192
Oct. 13	25	635,639	1,656,864
Oct. 20	26½	640,280	1,667,505
Oct. 27	25½	624,252	1,677,229
Nov. 3	27	612,457	1,669,217
Nov. 10	27½	594,932	1,675,760
Nov. 17	28	584,525	1,691,046
Nov. 24	29	561,313	1,705,413
Dec. 1	28	488,118	1,683,590
Dec. 8	30	551,011	1,743,427
Dec. 15	33½	579,935	1,767,418
Dec. 22	37½	.....	.....
Dec. 29	....	.....	.....

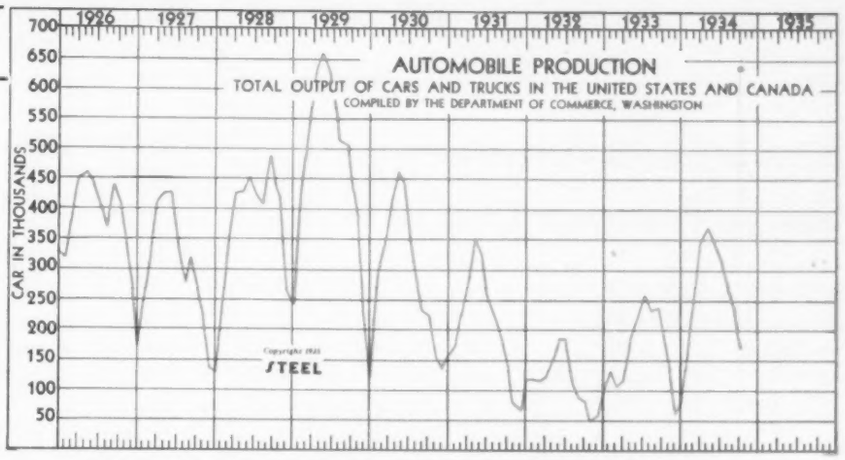
For week ended:	Steelwks. Operating Rate (per cent)	Freight Car Loadings (cars)	Electric Power Output (1000 kw.-hrs.)
Jan. 6	31	499,939	1,563,678
Jan. 13	30	555,627	1,646,271
Jan. 20	35	560,430	1,624,846
Jan. 27	33	561,566	1,610,542
Feb. 3	36	564,098	1,636,275
Feb. 10	39	572,504	1,651,535
Feb. 17	43	598,896	1,640,951
Feb. 24	47	573,371	1,646,465
March 3	48	604,137	1,658,040
March 10	51	612,402	1,647,024
March 17	50	625,773	1,650,013
March 24	49	608,462	1,658 389
March 31	49	608,443	1,665,650
April 7	48	557,887	1,616,945
April 14	51	578,837	1,642,187
April 21	55	589 453	1,672,765
April 28	57	608,654	1,668,564
May 5	60	604,205	1,632,766
May 12	62	601,739	1,643,433
May 19	59	611,142	1,649,770
May 26	57	624,567	1,654,903
June 2	60	578,541	1,575,828
June 9	62	615,565	1 654,916
June 16	62	617,649	1,665,358
June 23	59	621,872	1,674,566
June 30	46	644,572	1,688,211
July 7	22	519,807	1,555 844
July 14	30	602,778	1,647,680
July 21	30	614 864	1,663,771
July 28	29½	608,848	1,683,542
Aug. 4	26½	611 298	1,657,638
Aug. 11	27½	602 530	1 659,043
Aug. 18	21½	600.564	1,674,345
Aug. 25	20½	605,516	1,648,107
Sept. 1	18½	645,780	1,626,883





Automobile Production Shows Moderate Gain in 1934

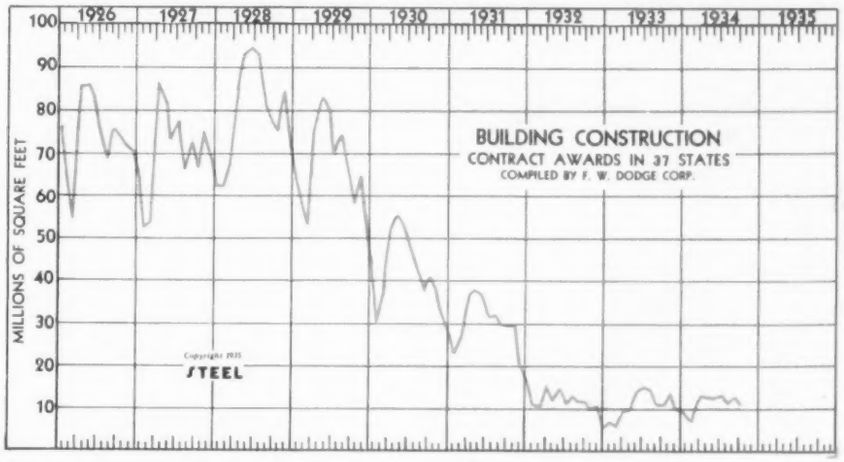
Statistics showing the total production of automobiles (passenger cars and trucks) and of passenger cars only for the United States and the total of passenger cars and trucks for Canada will be found on page 209 of this issue.

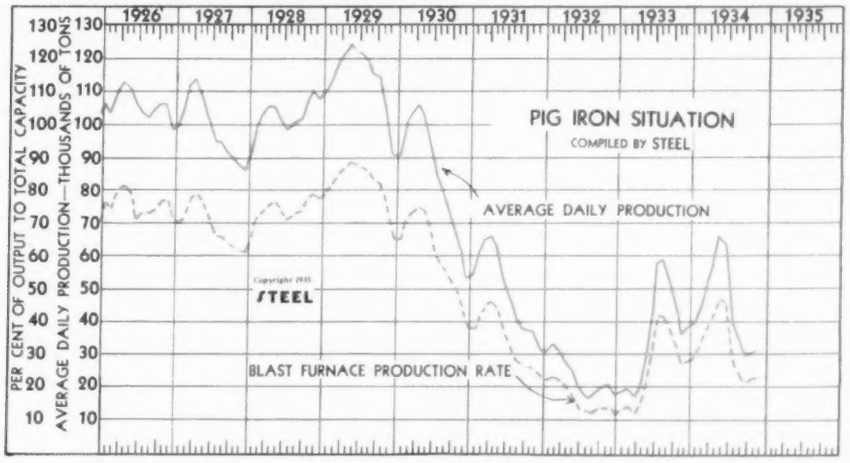

AUTOMOBILE PRODUCTION
TOTAL OUTPUT OF CARS AND TRUCKS IN THE UNITED STATES AND CANADA
COMPILED BY THE DEPARTMENT OF COMMERCE, WASHINGTON
CAR IN THOUSANDS
1926 1927 1928 1929 1930 1931 1932 1933 1934 1935
700 650 600 550 500 450 400 350 300 250 200 150 100 50
STEEL

Building Awards Still Lagging

1000 Square feet

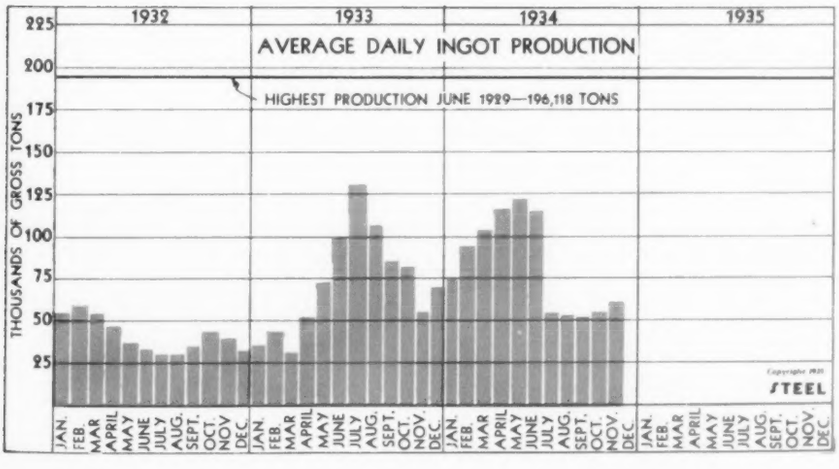
	1934	1933
Jan.	9,568	8,452
Feb.	8,176	7,382
Mar.	14,788	9,890
Apr.	14,207	10,870
May	14,664	15,277
June	13,986	16,075
July	13,250	14,548
Aug.	14,259	12,942
Sept.	12,510	12,867
Oct.	15,098	15,534
Nov.	.....	11,762
Dec.	.....	11,451


BUILDING CONSTRUCTION
CONTRACT AWARDS IN 37 STATES
COMPILED BY F. W. DODGE CORP.
MILLIONS OF SQUARE FEET
1926 1927 1928 1929 1930 1931 1932 1933 1934 1935
100 90 80 70 60 50 40 30 20 10
STEEL


PIG IRON SITUATION
COMPILED BY STEEL
AVERAGE DAILY PRODUCTION
BLAST FURNACE PRODUCTION RATE
PER CENT OF OUTPUT TO TOTAL CAPACITY
AVERAGE DAILY PRODUCTION—THOUSANDS OF TONS
1926 1927 1928 1929 1930 1931 1932 1933 1934 1935
130 120 110 100 90 80 70 60 50 40 30 20 10
STEEL

Iron Output Spotty in 1934

Figures on production and daily average output of pig iron and data on stacks in operation will be found on page 210.


AVERAGE DAILY INGOT PRODUCTION
HIGHEST PRODUCTION JUNE 1929—196,118 TONS
THOUSANDS OF GROSS TONS
1932 1933 1934 1935
225 200 175 150 125 100 75 50 25
JAN. FEB. MAR APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV DEC.
STEEL

Steel Ingot Output Exceeds That of 1933 By 12 Per Cent

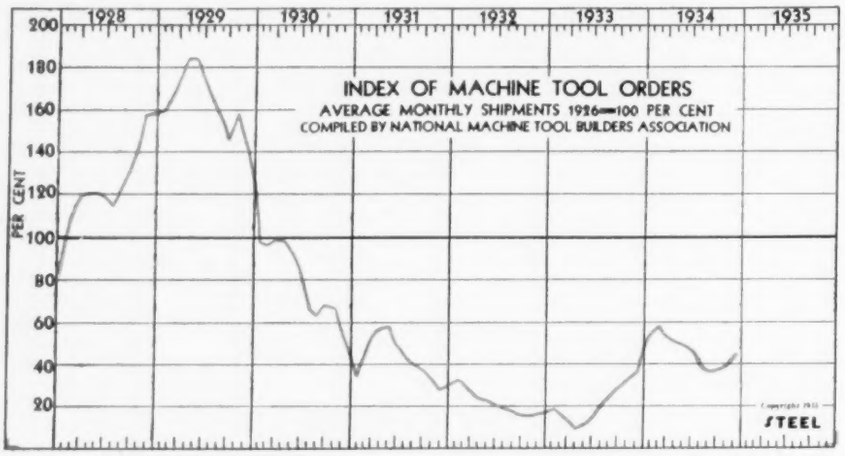
Figures on the monthly production and average daily output of steel ingots will be found on page 207. Operation of steelworks in percentage of capacity follow:

	Per cent			Per cent	
	1934	1933		1934	1933
Jan.	33.15	17.99	July	26.75	58.30
Feb.	41.31	20.57	Aug.	22.93	48.79
Mar.	46.44	15.30	Sept.	22.74	40.40
Apr.	52.64	24.76	Oct.	24.59	36.89
May	56.39	33.68	Nov.	27.76	26.92
June	52.68	45.37	Dec.	.....	33.19

Durable Goods Industries in Stronger Position at Close of 1934

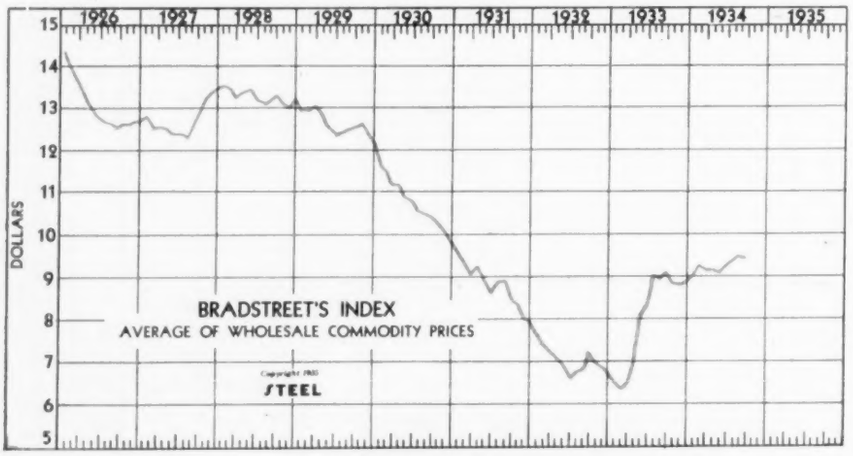
THAT industries depending upon activity in durable goods started later than other types of industry in sharing the gains of 1933 and 1934 is shown by the accompanying charts on orders for machine tools, foundry equipment and freight cars. Government action helped car awards in 1934, and increasing industrial activity was responsible for marked improvement in machine tool and foundry equipment orders in the last quarter.

Exports of iron and steel were much higher in 1934, due to shipments of scrap. Commodity prices maintained a general upward trend through much of the year. Commercial failures were at abnormally low levels in 1934. The liabilities involved also were under normal.



Index of Machine Tool Orders Tops Average for 1931

	1934	1933	1932	1931
Jan.	56.5	18.3	32.8	36.3
Feb.	58.2	15.2	30.4	40.6
March	50.9	11.1	23.9	49.6
April	48.5	8.3	20.6	56.6
May	46.8	10.6	20.8	57.3
June	42.6	15.5	21.7	49.2
July	38.6	22.4	18.7	41.1
Aug.	37.1	27.9	16.8	38.2
Sept.	37.4	30.9	15.3	35.0
Oct.	40.5	33.3	15.7	31.9
Nov.	44.2	38.0	16.4	28.0
Dec.	.....	51.0	17.6	30.1



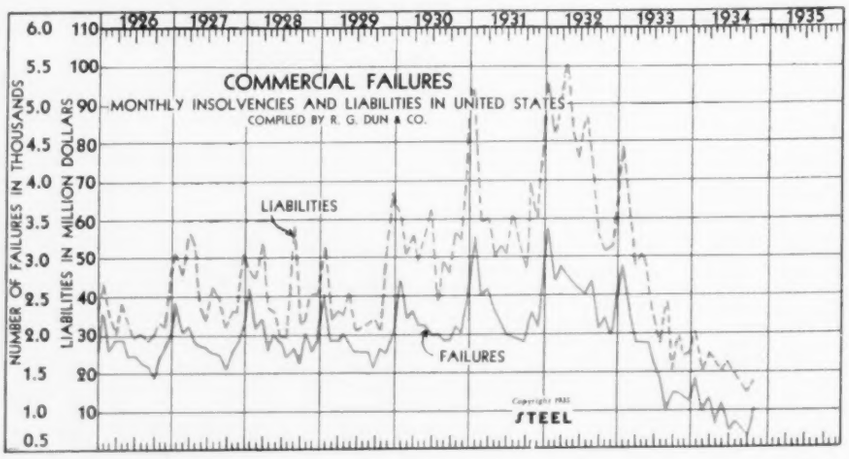
Commodity Price Index Strong

Bradstreet's

	1934	1933
Jan.	$9.01	$6.53
Feb.	9.26	6.35
Mar.	9.17	6.54
Apr.	9.16	6.98
May	9.14	8.02
June	9.24	8.34
July	9.32	9.01
Aug.	9.48	8.99
Sept.	9.45	9.05
Oct.	9.27	8.84
Nov.	9.29	8.81
Dec.	.....	8.83

Commercial Failures at Low Levels Throughout Past Year

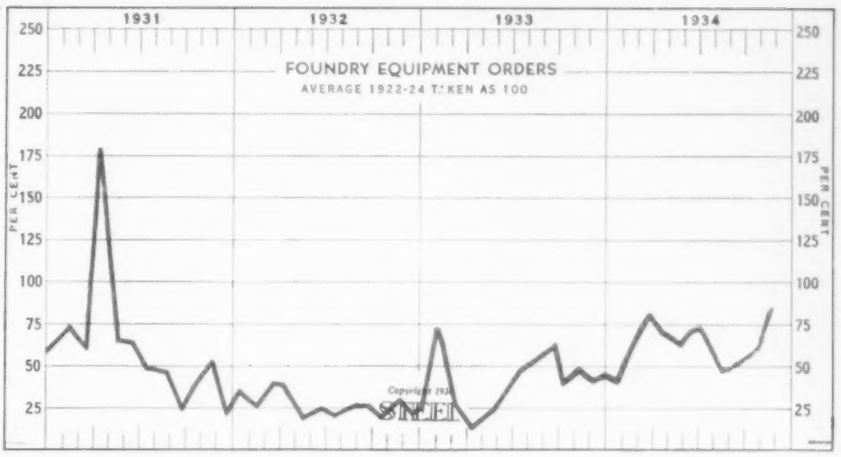
	1934	1933	1932
Jan.	1,364	2,919	3,458
Feb.	1,049	2,378	2,732
March	1,102	1,948	2,951
April	1,052	1,921	2,816
May	977	1,909	2,788
June	1,033	1,648	2,688
July	912	1,421	2,596
Aug.	929	1,472	2,796
Sept.	790	1,116	2,182
Oct.	1,091	1,206	2,273
Nov.	923	1,237	2,073
Dec.	.....	1,132	2,469



Index of New Orders for Foundry Equipment

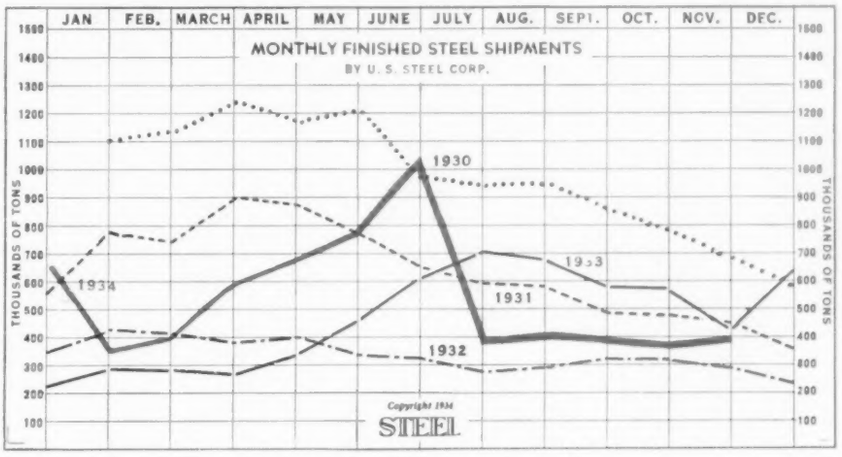
	1934	1933		1934	1933
Jan.	37.2	68.4	July	50.7	48.8
Feb.	65.8	16.1	Aug.	43.1	56.3
March	75.4	9.8	Sept.	46.4	34.9
April	67.9	19.4	Oct.	55.3	42.6
May	66.5	25.6	Nov.	80.4	36.6
June	70.4	45.5	Dec.		43.8

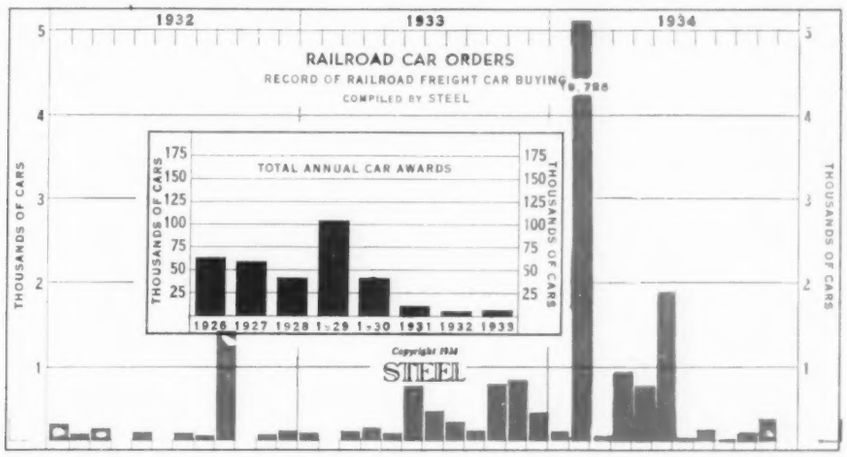
Compiled by the Foundry Equipment Manufacturers association.



Shipments of Steel, U. S. Steel Corp.

	Gross Tons	
	1934	1933
Jan.	331,777	285,138
Feb.	385,500	275,929
March	588,209	256,793
April	643,009	335,321
May	745,063	455,302
June	985,337	603,937
July	369,938	701,322
Aug.	378,023	668,155
Sept.	370,306	575,161
Oct.	343,962	572,897
Nov.	366,119	430,358
Dec.		600,639

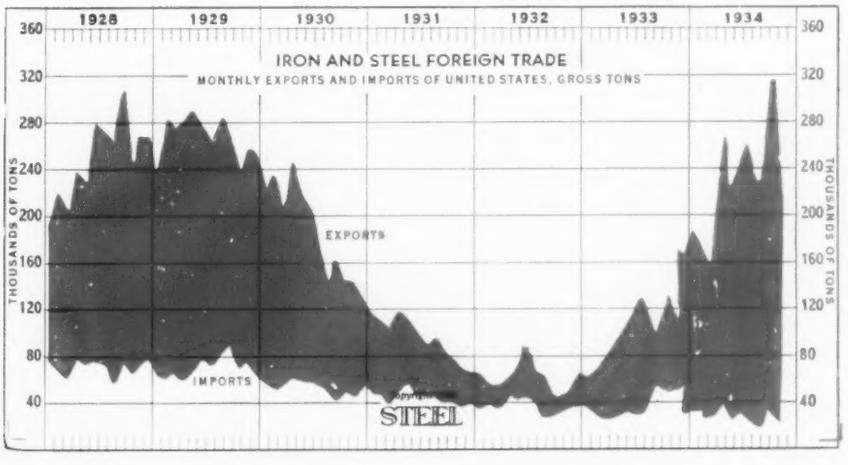




Orders for R.R. Freight Cars

	1934	1933
Jan.	152	3
Feb.	19,725	0
March	30	5
April	800	50
May	717	8
June	1,835	500
July	19	306
Aug.	105	202
Sept.	7	23
Oct.	75	514
Nov.	254	533
Dec.		316
Total	23,719*	2,460

*11 months

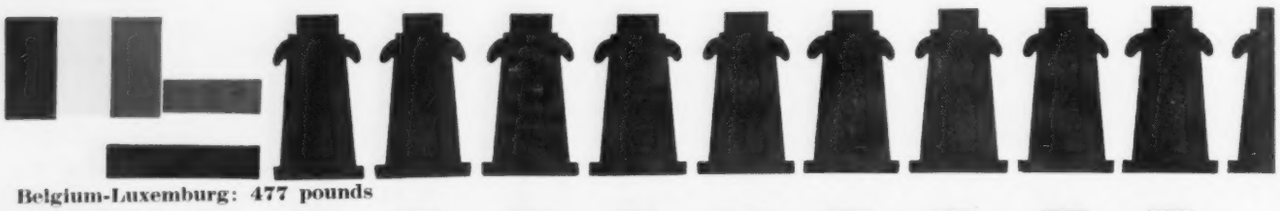


United States Imports and Exports of Iron and Steel

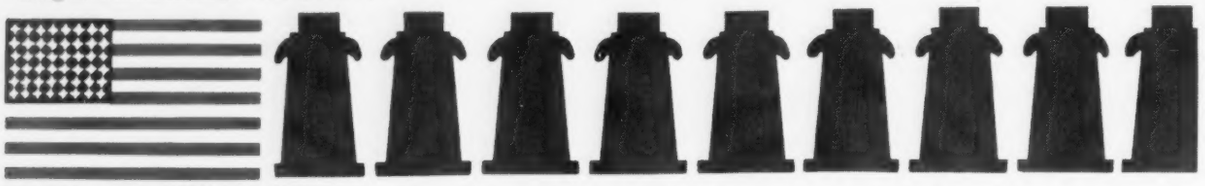
	Gross Tons			
	1934		1933	
	Imports	Exports	Imports	Exports
Jan.	22,653	178,023	21,892	56,720
Feb.	25,407	151,184	19,748	63,936
Mar.	38,393	261,269	22,114	80,567
April	26,862	201,539	28,061	100,395
May	29,465	241,753	26,295	123,069
June	24,848	219,406	34,368	102,581
July	17,676	233,186	52,805	83,311
Aug.	32,418	242,947	46,839	119,374
Sept.	23,847	301,330	55,706	108,799
Oct.	20,202	220,239	46,673	164,755
Nov.	35,272	.....	28,979	157,600
Dec.	.....	.....	31,310	184,585
Total	297,053‡	2,250,846*	414,790	1,350,692

‡11 months. *10 months.

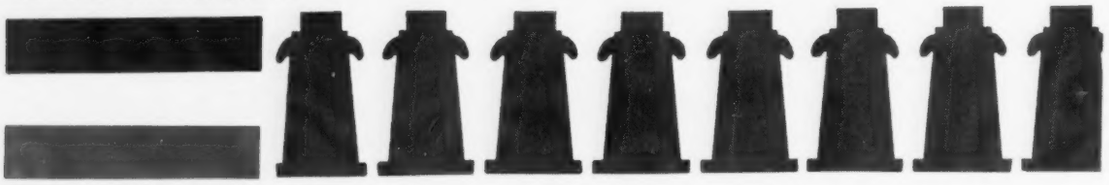
Belgium-Luxemburg Leads in Per Capita Steel Consumption



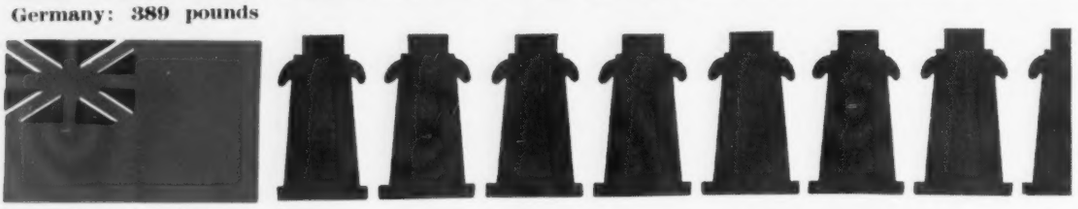
Belgium-Luxemburg: 477 pounds



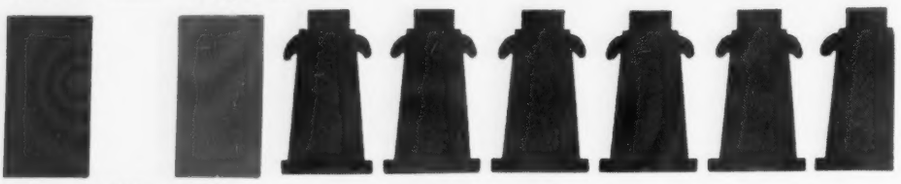
United States: 447 pounds



Germany: 389 pounds

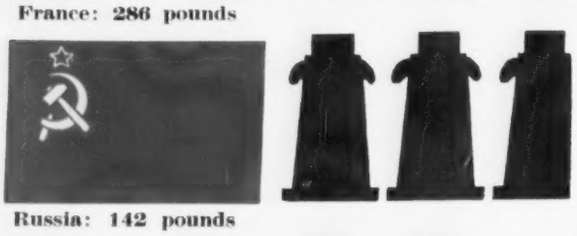


Great Britain: 371 pounds

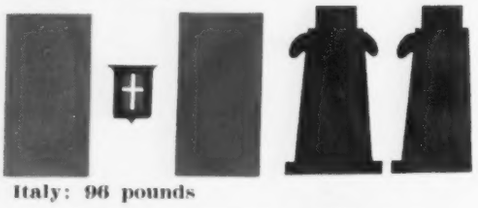


France: 286 pounds

Each Ingot Mold Represents 50 Tons of Steel Consumed per Inhabitant



Russia: 142 pounds



Italy: 96 pounds

Japan: 53 pounds

Germany Climbs to Third Place

AS IT did in 1932 and 1933, little Belgium-Luxemburg in 1934 led the world in per capita consumption of steel, averaging a domestic use of 477 pounds per inhabitant. Over the average of 418 pounds in 1933, this was an increase of 15 per cent.

Second, as last year, was the United States with a domestic consumption of 447 pounds per inhabitant, a gain of 37 pounds, or 9 per cent.

Regaining her stride, Germany in 1934 moved up from fifth place to third, per capita consumption being 389 pounds, an improvement of 156 pounds, or 63 per cent over 1933.

Great Britain increased 23 per cent last year, or from 302 pounds to 371, but on account of Germany's bulge was forced down to fourth place.

France, including the Saar, at 286 pounds, was the only large power to show a decrease, retreating from 301 pounds in 1933. Russia forged ahead 33 per

cent, from 107 pounds per inhabitant in 1933 to 142 pounds in 1934, but remained far behind France in sixth place.

A gain of only 2 pounds per inhabitant, or 2 per cent, left Italy in seventh place with an average of 96 pounds.

At 53 pounds, Japan showed an increase of 8 pounds, or 18 per cent, over 1933, bringing up the rear of world powers.

Per capita consumption is based upon domestic production, plus imports, minus exports, divided by the number of inhabitants in the case of Belgium-Luxemburg, United States, Germany, Great Britain and France. Also, in these countries an adjustment is made for scrap. For Russia, Italy and Japan, reliable statistics on exports and imports are not available, but their incidence would be negligible.

Per Capita Production in United States

	Population in thousands	Output Steel Ingots, Castings, gross tons, thousands	Output per capita, pounds	Pig Iron output in gross tons, thousands	Output per capita, pounds
1934	126,425	25,953	460	16,057	284
1933	125,693	23,156	413	13,222	234
1932	124,822	13,500	242	8,800	158
1931	124,070	25,630	463	18,263	330
1930	122,775	40,278	734	31,441	573
1929	121,500	56,433	1,040	42,614	786
1928	120,013	51,544	962	38,155	712
1927	118,628	44,935	848	36,511	691
1926	117,136	48,294	924	39,372	752
1925	115,378	45,394	881	36,700	713
1924	113,727	37,932	746	31,406	618
1923	111,693	44,943	911	40,361	806
1922	109,893	35,603	726	27,219	554
1921	108,445	19,783	409	16,688	344
1920	106,422	42,132	887	36,926	777
1919	105,003	34,671	739	31,015	661
1918	103,587	44,462	961	39,054	843
1917	102,172	45,060	987	38,621	846
1916	100,757	42,773	950	39,434	876
1915	99,342	32,151	724	29,916	677
1914	97,927	23,513	509	23,332	533
1913	96,512	31,300	725	30,966	717
1912	95,097	31,251	736	29,726	700
1911	93,682	23,676	565	23,649	564
1910	92,174	26,094	634	27,303	663
1900	75,995	10,188	300	13,789	406
1890	62,948	4,277	152	9,202	327
1880	50,156	1,247	55	3,835	171

Steel Production in World in 1934 Again Overtakes 1913

By VINCENT DELPORT
European Manager, STEEL

FOR the first time for four years, world steel production has once more exceeded the 1913 tonnage; pig iron output, on the other hand, still requires some sixteen million tons to equal the tonnage produced in the last pre-war year.

Both for steel and pig iron, however, progress was well marked during 1934, and the year ended with a tendency toward a further rise in most of the steel-producing countries.

World output of steel ingots and castings in 1934 is estimated by STEEL at 79,778,000 gross tons, compared with 66,171,000 tons in 1933 and 49,721,000 tons in 1932.

The total pig iron output for 1934 was 61,132,000 gross tons, against 48,531,000 tons in 1933 and 38,968,000 tons in 1932.

The United States continues to lead all other nations in iron and steel production, although progress during 1934 was not so marked as in some of the leading European countries. American output of steel ingots and castings was 25,953,000 tons, an increase of 12 per cent over the 1933 tonnage. In pig iron the output for the year was 16,057,000 tons, or 21 per cent more than in 1933.

The share of the United States in world production was 32.25 per cent for steel and 26 per cent for pig iron, slightly less than in 1933.

The European nations produced 48,685,000 tons of steel in 1934, compared with 38,845,000

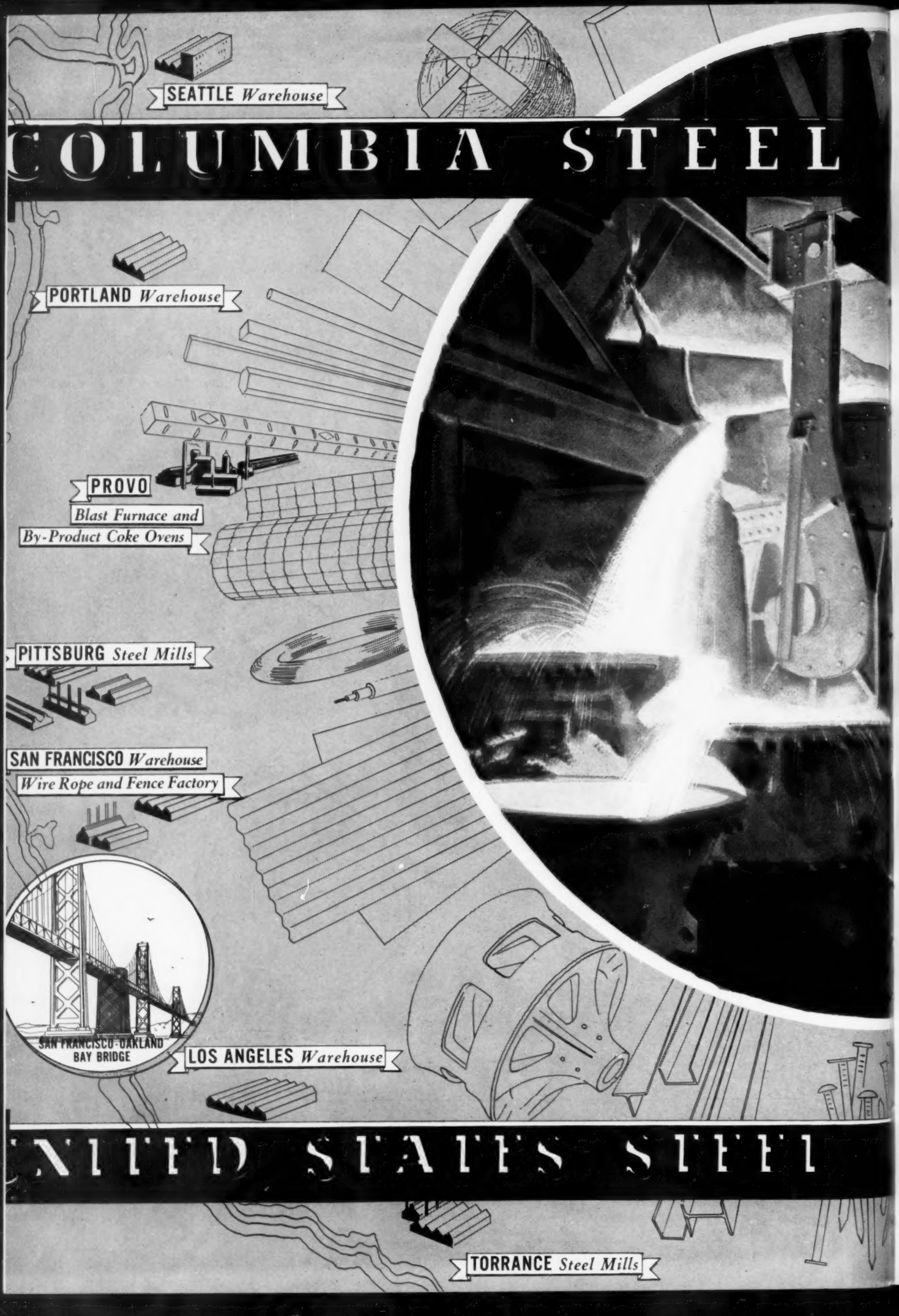
(*Please turn to Page* 145)

World Production of Steel Ingots and Castings

Gross Tons

	1934	1933	1932	1931	1930	1929	1928	1927	1926	1913
United States	25,953,000	23,156,000	13,500,000	25,630,000	40,278,000	55,650,000	50,887,000	44,935,000	48,294,000	31,301,000
Canada	780,000	408,000	335,000	671,000	1,009,000	1,391,000	1,240,000	907,000	782,000	1,043,000
Great Britain	9,000,000	7,003,000	5,261,000	5,203,000	7,326,000	9,636,000	8,520,000	9,099,000	3,596,000	7,664,000
France	6,050,000	6,427,000	5,550,000	7,697,000	9,296,000	9,544,000	9,348,000	8,173,000	8,295,000	4,614,000
Belgium	2,895,000	2,678,000	2,745,000	3,073,000	3,300,000	4,066,000	3,872,000	3,645,000	3,320,000	2,428,000
Luxemburg	1,905,000	1,815,000	1,925,000	2,002,000	2,234,000	2,659,000	2,526,000	2,431,000	2,208,000	.....
Italy	1,800,000	1,755,000	1,369,000	1,430,000	1,746,000	2,109,000	1,932,000	1,570,000	1,752,000	919,000
Spain	535,000	475,000	525,000	594,000	910,000	985,000	770,000	653,000	598,000	238,000
Sweden	815,000	620,000	520,000	530,000	601,000	683,000	567,000	491,000	487,000	582,000
Germany	11,825,000	7,465,000	5,678,000	8,136,000	11,354,000	15,986,000	14,285,000	16,050,000	12,145,000	18,632,000
Austria	250,000	222,000	201,000	317,000	461,000	622,000	626,000	551,000	473,000	2,585,000
Czechia	970,000	735,000	662,000	1,490,000	1,721,000	2,103,000	1,704,000	1,662,000	1,316,000	.....
Poland	850,000	805,000	542,000	1,020,000	1,217,000	1,355,000	1,226,000	1,226,000	775,000	.....
Hungary	300,000	224,000	177,000	311,000	363,000	505,000	478,000	464,000	320,000	.....
Russia	9,250,000	6,746,000	5,900,000	5,333,000	5,610,000	4,828,000	4,206,000	4,150,000	3,087,000	4,181,000
Japan	3,000,000	2,600,000	2,300,000	1,834,000	2,288,000	2,249,000	1,840,000	1,658,000	1,475,000	300,000
India	750,000	694,000	570,000	625,000	619,000	575,000	410,000	575,000	520,000	.....
Australia	550,000	393,000	221,000	360,000	420,000	460,000	462,000	466,000	338,000	.....
Saar	1,950,000	1,650,000	1,440,000	1,513,000	1,904,000	2,174,000	2,040,000	1,865,000	1,709,000	.....
Miscellaneous	350,000	300,000	300,000	350,000	400,000	400,000	350,000	305,000	175,000	200,000
WORLD TOTAL	79,778,000	66,171,000	49,721,000	68,119,000	93,057,000	117,980,000	107,477,000	100,876,000	91,898,000	74,687,000

German figures in 1913 are for pre-war territory. Austrian figures in 1913 include the major portion of Czechia and Hungary. Japan's figures include Manchuria and Korea.


SEATTLE Warehouse
COLUMBIA STEEL
PORTLAND Warehouse
PROVO
Blast Furnace and
By-Product Coke Ovens
PITTSBURG Steel Mills
SAN FRANCISCO Warehouse
Wire Rope and Fence Factory
SAN FRANCISCO-OAKLAND
BAY BRIDGE
LOS ANGELES Warehouse
UNITED STATES STEEL
TORRANCE Steel Mills

Exports and Imports of the Principal Countries

(Gross tons—Scrap eliminated)

Country	EXPORTS 1934	1933	1932	1931	1913	IMPORTS 1934	1933	1932	1931	1913
United States	1,000,000	569,000	367,000	829,000	2,648,000	280,000	358,000	369,000	404,000	273,000
Great Britain	2,250,000	1,922,000	1,887,000	1,979,000	4,969,000	1,375,000	971,000	1,594,000	2,845,000	2,331,000
Germany	2,500,000	1,919,000	2,152,000	3,947,000	6,200,000*	1,450,000	924,000	680,000	830,000	*300,000
France‡	2,750,000	2,672,000	2,410,000	3,574,000	640,000	205,000	249,000	260,000	378,000	185,000
Belgium & Luxemburg	3,300,000	3,150,000	3,311,000	3,663,000	1,550,000†	300,000	306,000	294,000	475,000	†874,000
	11,800,000	10,232,000	10,127,000	13,992,000	16,007,000	3,610,000	2,808,000	3,197,000	4,932,000	3,963,000

*Includes the Saar and Luxemburg. †Belgium only. ‡Includes the Saar, except for 1913.

(*Concluded from Page* 141)

tons in 1933, an increase of 25.5 per cent. For pig iron the output was 40,435,000 tons, against 31,355,000 tons, an increase of 29 per cent. France was the only important producing-country where output receded in 1934, both for steel and pig iron.

For steel, the most spectacular advance was made by Germany, where output increased by 58.5 per cent, from 7,465,000 tons in 1933 to 11,825,000 tons in 1934. Germany was easily the leader among the steel-producing countries of Europe in 1934. Russia and Great Britain followed, with an increase of 37 per cent for the former and 28.5 per cent for the latter. France now takes fourth place in Europe, after having been second in 1933.

Other European countries which exceeded the million-ton mark include: Belgium, the Saar territory, Luxemburg, Italy; they increased their output by 8 per cent, 18 per cent, 5 per cent and 2.5 per cent, respectively. Among the smaller nations, the increase in steel production was most marked in Sweden and Czecho-Slovakia.

Outside the United States and Europe, a good recovery was made by Canada, where production of steel increased by 90 per cent, from 408,000 tons in 1933 to 780,000 tons in 1934. Japan continued to progress, as also did India and Australia.

If one turns to pig iron production, one finds that Russia heads all other countries excepting the United States. Germany comes next with an increase of 68 per cent from 1933 to 1934. France and Great Britain follow, almost together, with this difference, that France's output actually receded in 1934, whereas Great Britain advanced by 45 per cent. As regards other countries, in Europe as well as in other parts of the world, the trend of pig iron production followed closely upon that of steel.

It is interesting to note that in 1933 the production of pig iron in the world was only 73 per cent of the output of steel; in 1934 the proportion was 78 per cent, indicating a slightly better showing for pig iron. The deduction may also be made that the total output of steel in the world in 1934 was still only 67 per cent of the all-time record attained in 1929, but that Russia, Japan, and also Sweden, India and Australia, have individually reached their own record production of steel in 1934. Russia and Japan have also exceeded all previous figures for their pig iron production.

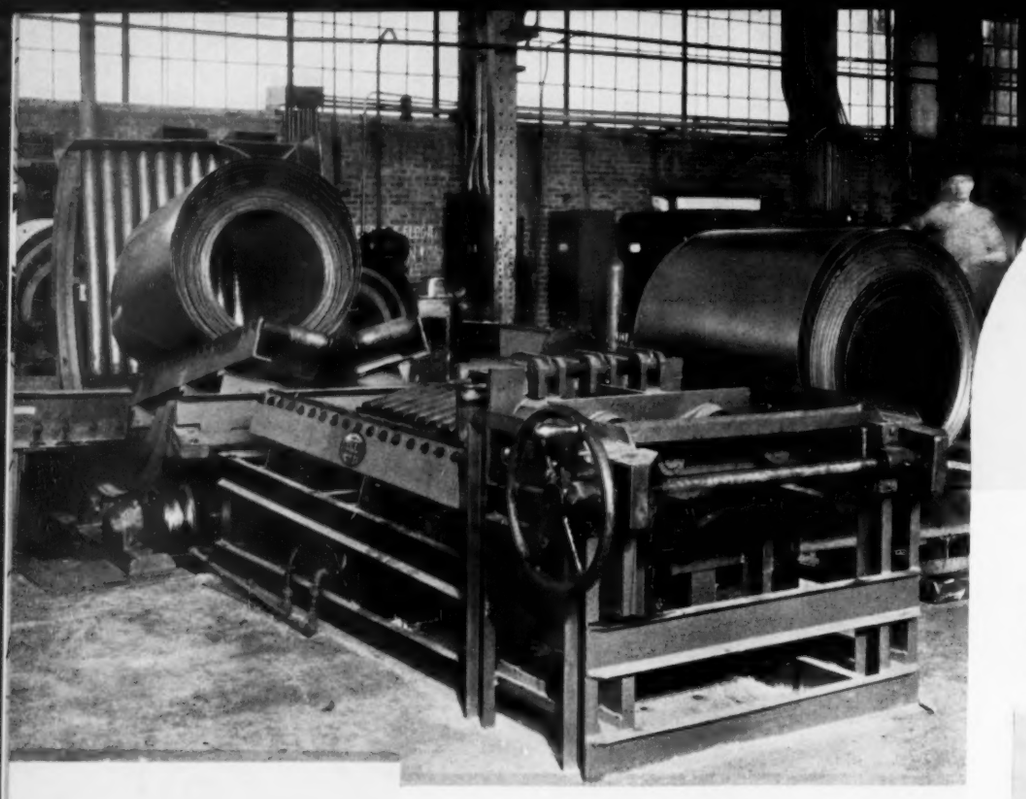
The past year has seen greater activity in the exchange of iron and steel from one country to another. The accompanying table of iron and steel exports and imports shows an increase in both directions, the volume of exchanges surpassing that of 1933 and 1932. From the point of view of exports, the greatest advance was made by the United States. Belgium and Luxemburg, although smallest in territory, maintain first rank as an iron and steel exporting group.

World Production of Pig Iron

Gross Tons

	1934	1933	1932	1931	1930	1929	1928	1927	1926	1913
United States	16,057,000	13,222,000	8,674,000	18,263,000	31,441,000	42,270,000	37,832,000	36,289,000	39,101,000	30,653,000
Canada	415,000	259,500	160,000	466,000	813,000	1,160,000	1,083,000	769,000	795,000	1,015,000
Great Britain	6,000,000	4,124,000	3,574,000	3,773,000	6,192,000	7,589,000	6,611,000	7,294,000	2,458,000	10,260,000
France	6,050,000	6,223,000	5,448,000	8,068,000	9,874,000	10,198,000	9,821,000	9,125,000	9,281,000	5,126,000
Belgium	2,865,000	2,701,000	2,705,000	3,180,000	3,311,000	4,030,000	3,843,000	3,692,000	3,345,000	2,445,000
Luxemburg	1,925,000	1,858,000	1,929,000	2,020,000	2,433,000	2,860,000	2,726,000	2,688,000	2,472,000	.....
Italy	560,000	544,000	481,000	532,000	569,000	718,000	545,000	487,000	505,000	420,000
Spain	365,000	340,000	296,000	468,000	606,000	740,000	552,000	603,000	479,000	418,000
Sweden	500,000	341,000	277,000	411,000	488,000	516,000	431,000	448,000	493,000	730,000
Germany	8,650,000	5,183,000	3,870,000	5,964,000	9,540,000	13,187,000	11,615,000	12,893,000	9,490,000	19,000,000
Austria	125,000	87,000	93,000	143,000	282,000	455,000	451,000	428,000	328,000	2,344,000
Czechia	610,000	491,000	443,000	1,146,000	1,414,000	1,618,000	1,544,000	1,241,000	1,071,000	.....
Poland	385,000	300,000	196,000	341,000	470,000	693,000	673,000	607,000	322,000	.....
Hungary	125,000	92,000	65,000	157,000	253,000	362,000	281,000	294,000	185,000	.....
Russia	10,000,000	7,074,000	6,101,000	4,782,000	4,920,000	4,253,000	3,322,000	3,290,000	2,395,000	4,563,000
Japan	2,250,000	2,000,000	1,525,000	1,385,000	1,635,000	1,491,000	1,520,000	1,263,000	1,160,000	236,000
India	1,200,000	1,065,000	914,000	1,072,000	1,180,000	1,348,000	1,055,000	1,145,000	902,000	204,000
Australia	500,000	336,000	190,000	380,000	308,000	420,000	410,000	550,000	442,000	47,000
Saar	1,800,000	1,566,000	1,327,000	1,491,000	1,881,000	2,071,000	1,905,000	1,743,000	1,599,000	.....
Miscellaneous	750,000	725,000	700,000	800,000	750,000	750,000	850,000	750,000	750,000	339,000
WORLD TOTAL	61,132,000	48,531,000	38,968,000	54,842,000	78,360,000	96,729,000	87,070,000	85,590,000	77,573,000	77,714,000

German figures in 1913 are for pre-war territory. Austrian figures in 1913 include the major portion of Czechia and Hungary. Japan's figures include Manchuria and Korea.



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ENGINEERING PROGRESS IN 1934

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In presenting its eighth annual composite review of engineering progress in the iron, steel and metalworking industries, STEEL gratefully expresses appreciation and acknowledges indebtedness to the more than 140 engineers, metallurgists and operating officials whose generously contributed opinions have made possible the resume of technical advancement set forth in the following pages.

—The Editors

METHODS AND MATERIALS

Metal Surfaces Treated and Finished More Effectively

SURFACE treatment of steel and other metals made important advances in 1934. News columns in STEEL all during the year devoted much space to new methods of corrosion protection and new methods of surface treating and finishing both mill and fabricated products. These involved not only surface treatment and coatings of various kinds, but the development of composite products in which the characteristics of two or more materials are combined.

Such new composite products included felt bonded to steel, rubber bonded to steel, steel and copper composite sheets bonded by felt and asphalt, gold-clad stainless steel, improved stainless-clad mild steel, bakelite bonded to rubber, and improved composite sheets of metal and plywood.

Great progress was made in the prefinishing of flat material. Steel sheets with a prefinished lacquer coating came into use for a variety of purposes in the automotive and other industries. By their use the necessity of finishing the final formed product is eliminated. Chrome, nickel and cadmium plated metals of all kinds were made available in the form of sheets and strip in coils. Chromium plated dies, together with improved die lubricants, permit forming of these materials without damage to the finish.

In commenting on developments during the year, Truscon Laboratories, Detroit, mention the difficulty, under field conditions, of thoroughly cleaning rust off steel surfaces to be painted, accounting for the fact that pit and scale marks on steel tanks and structural members frequently reappear after each painting. Primers developed by this and other companies serve the purpose of sealing rust and rendering it dormant, and at the same time provide a good surface for the application of paint.

Though zinc provides excellent rustproofing for steel, says F. P. Spruance, American Chemical Paint Co., Ambler, Pa., its effectiveness in the past was hindered greatly by its peculiar property of saponifying paint oils and of shedding them.

Another phase of this same problem is commented on by N. M. Collart, Sherwin-Williams Co., Cleveland, who recalls the great damage to railroad cars, truck bodies and other structures by the extreme cold weather of the winter of 1933-34, when painted coatings on galvanized surfaces became disrupted by contraction of the metal and fell off.

Developments by these companies and others have solved these problems to a large extent. New treatments and primer coats make it possible to apply paint and lacquers on zinc, zinc alloy and cadmium surfaces with the assurance that they will adhere.

New Rustproofing Process

Much progress has been made in rustproofing steel. One new electrolytic plating process places a rust resistant and paint receptive surface on steel. A new dipping process conditions steel surfaces so as to lengthen the life of paints, lacquers and enamels subsequently applied to them.

Several new acid and alkali resisting paints were announced during 1934, some of them having chlorinated rubber as a base. Metal spraying came into wider use and in new applications; food tanks, for instance, are sprayed with tin; parts too large to be cadmium plated are sprayed with cadmium. The spraying process is widely used for depositing wear and corrosion resisting surfaces or inlays. Life of steel exposed to heat is lengthened by a coating of sprayed aluminum; under the action of the heat, ferroaluminum, which is highly resistant to heat, is formed.

AN ELECTROLYTIC brightening treatment, known as the Alzak process, gives to aluminum surfaces a reflectivity value of 85 per cent, approaching silver. Sealed with the new Alumilite finish, this brightened surface resists atmospheric attack. The alumilite finish, a heavy oxide coating artificially applied, may be impregnated with pigments to obtain any desired color. Several new aluminum paints were developed, one of which involves in its manufacture a vacuum method of exploding lumps, thus yielding a paint which spreads more easily. A new aluminum paint of refractory value also was developed.

The year witnessed a further trend toward the use of color, not only in decorating fabricated products for sale to the general public, but also in industrial uses. Greenish gray, bright red, yellow and orange are some of the colors now used in finishing machine tools. Most of the impetus in this use of colors has come from the users, many of whom have found that the treatment of equipment and plant interiors with bright paint improves performance of workmen.

Development of water wash spray booths during the year, says the De Vilbiss Co., Toledo, O., makes possible the use of the slower drying finishing materials in closely congested quarters where the conventional type of spray booth did not meet conditions. This

company also stresses progress in designing spray guns for greater speed and superior finish with the new painting and finishing materials.

USE of induction type ovens for drying paint and enamels on sheet metal has proven to be an excellent means of performing drying work and eliminating currents and dirt in paint operations, says D. A. Wallace, vice president in charge of manufacturing, Chrysler Sales Corp., Detroit. There also has been great improvement in the building of ovens for the spraying of material, removing many of the elements which formerly made this job very distasteful. These changes permit the use of conditioned air in the spray booths and make them just as clean as it is possible to be; in fact, men working in the spray operations now do not get a particle of paint on their clothes or faces and the conditions under which they work contribute toward high quality.

Automatic Polishing and Buffing

Rustproofing of sheet metal, bodies and the material going into automobiles, continues Mr. Wallace, has resulted in the development of equipment and cost that makes it possible to have a product that affords the user a minimum amount of trouble from the standpoint of finishes.

"A development that also has come to the writer's attention this year," says Mr. Wallace, "is the automatic polishing and buffing machine. These machines are useful in finishing chrome molding or any other irregular part regardless of shape, polishing the sides, corners and radius automatically at a high speed. This method now is used in the original metal finishing, polishing of copper plate, polishing and buffing of nickel and the polishing and buffing of chrome plate."

Principal development in the electroplating field during 1934, says George G. Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J., is the work of the American Electroplaters society in conjunction with the American Society for Testing Materials and the national bureau of standards, in compiling specifications for the electroplating of steel. One of the points conclusively revealed in the report on this work, for instance, is that the customary thin chromium coatings, 0.00002-inch thick, increase the resistance to tarnish but not the protection against corrosion. The report is embodied in two research papers, RP712 and RP724, of the national bureau of standards, available at 5 cents each from the superintendent of documents, United States government printing office, Washington.

AN OUTSTANDING development in electroplating during 1934, says the Udylite Process Co., Detroit, was the commercial acceptance of nickel plating baths which produce bright nickel deposit direct from the solution. Ordinary nickel has a dull grayish appearance and must be buffed. The object of the bright nickel solution is to obtain a coating that needs no buffing. Another nickel plating contribution is a plating bath for the deposition of nickel direct on zinc base die castings without the necessity of the preliminary copper strike homogeneous coating.

During the year an altogether new method of determining the thickness of cadmium coatings was developed. Since the thickness of protective coatings is the measure of their efficiency, this means of determining thickness has been a boon to the industry. Furthermore, the new test determines the minimum thickness at any one point of the tested surface. Former tests gave the average thickness on the article and did not show up possible weak spots in the coating. Another cadmium plating development is the coating of steel strip by a continuous process. Especially formulated cadmium bath was provided for this particular purpose. While copper and zinc coated strip are fairly common, cadmium coated strip made its first appearance during 1934.

Acid Tin Bath Developed

Alkaline stannate baths for tin plating are very difficult to control, says the Udylite Process Co. Their composition changes quickly, thus introducing a hazard into the plating procedure. In order to overcome this difficulty, an acid tin bath has been developed and it is believed that this new type of solution will be much easier to control.

IN REVIEWING progress in hot dip galvanizing, Wallace G. Imhoff, president, the Wallace G. Imhoff Co., Vineland, N. J., stresses the importance of new commercial cleaners. A new organic detergent used in pickling

(*Please turn to Page* 263)

Miscellaneous Developments in Methods And Materials Made in Many Fields

METHODS and materials employed in the metalworking and fabricating industries reflected great progress during 1934. Those headings under which the greatest advance was recorded include surface treatment, alloy and high test castings, machine gas cutting, high tensile steels and other weight saving or light weight materials, refractory concrete and abrasives.

Much of the progress was of a miscellaneous character, preventing its classification. During 1934, STEEL's engineering section contained nearly 700 articles and short features covering new developments of wide interest to the metalworking and fabricating industries. An average of 13 of these features, of a "what to use" or "how to do it" character, appeared in each issue throughout the year.

Reflecting this progress along miscellaneous lines, a list of representative titles of features that appeared in STEEL during current issues in 1934 is set forth as follows:

How dry ice is used successfully to shrink in valve seat inserts. 3/19, p. 40.

Black spots in porcelain enamel coatings—how they can be eliminated by covering affected parts with rubber. 2/5, p. 34.

Restoring tension of piston rings—how "snap" can be restored to rings by heating them in oxyacetylene flame and cooling in air. 1/29, p. 34.

Painting milling machine a bright red instead of gray caused machine operators to do better work. 4/30, p. 27.

Extruded steel forgings—recent developments in the production and application of. 5/7, pp. 25-27.

Steels for heat treated gears—an article dealing with qualities of various steels to help user in selecting the right steel for the purpose. 6/11, pp. 48-51.

Felt bonded metal tested for many applications; description of a new composite sheet which may be used as such or which may be veneered with bakelite, lacquer or plywood. 8/6, p. 46.

Stainless steel, rolled 0.002-inch thick, 70 inches wide and up to 200 feet long, used for covering airplane wings. 8/27, p. 34.

Making terne plate tanks—cautions to be observed by fabricators of tanks of terne plate or tin plate. 9/3, p. 32.

Brazing with silver solders—a detailed description of such brazing and a

(*Please turn to Page* 264)

Grain Size Effect in Heat Treatment Better Understood

DEVELOPMENTS in heat treating, and metallurgy as it is related to heat treating, appeared to be in the direction of the trends in recent years with outstanding new processes and innovations few during the past year. Grain size control in steel was a problem on which much new light was thrown in 1934; today metallurgists have a clearer understanding of its importance and influence on the life and performance of heat treated products.

Notable in the design and installation of furnace equipment was wider use of controlled atmospheres. Greater effort was expended to improve furnace insulation and thus to reduce radiation losses and gain efficiency. Substantial improvements were made in automatic temperature control apparatus, thereby establishing greater accuracy and uniformity of temperature. Problems of the heat treating plant became more complex with the automotive industry utilizing a larger number of steels. Other developments deserving comment were increasing favor shown toward surface hardening by liquid baths and gases, and localized hardening by the electric induction method.

No single accomplishment in the field of heat treatment of steel appeals to H. S. Rawdon, chief, division of metallurgy, national bureau of standards, Washington, as the outstanding development of 1934; however, he is impressed with the splendid progress made as a culmination of the work of several years past in clarifying and stabilizing the fundamental ideas on the subject of heat treating, particularly in showing why steels of the same nominal composition may differ so decidedly in their response to the same heat treatment.

Uniform Heat Treatment Results

In the opinion of Mr. Rawdon, the role played by austenitic grain size and the control of austenitic grain size in steelmaking have been so clearly demonstrated during the past year that one can now specify the steel desired and confidently expect that the heat treated product will not deviate far from his expectations.

Grain size and its relation to heat treatment was discussed at some length in a lecture which R. S. Archer, metallurgical department, Republic Steel Corp., Chicago, presented before the American Society of Mechanical Engineers during the National Metal congress last October. Mr. Archer said "the knowledge developed in recent years from studies of grain growth characteristics, normality, and hardenability has done much to dispel some of the mystery surrounding that rather vague quality of steel, particularly tool steel, which used to be referred to as 'body'."

Mr. Archer also commented on the recent outstanding trend in the use of molybdenum in alloy steels. This element generally is used in amounts from about 0.1 to 0.4 per cent and is commonly added in conjunction with nickel, chromium, or nickel and chromium. In the nickel and nickel-chromium steels, molybdenum promotes deep hardening, and also seems to have a rather specific effect in reducing or eliminating temper brittleness. In any steel, it favors the retention of hardness and strength at elevated temperatures. Considerable development work is going on at the present time on carbon-molybdenum steels, usually with somewhat increased manganese contents.

Control Brings Improved Properties

The matter of grain size has attracted much attention of metallurgical societies and numerous meetings have been held for the discussion of the subject. Notable among these meetings was the grain size symposium held by the American Society for Metals during its New York convention last fall in which 12 papers were presented and discussed. Reports on this symposium were published in the Oct. 22, Oct. 29 and Nov. 5 issues of STEEL.

Choosing to comment also on grain size in reviewing the year's heat treating progress, O. W. McMullan, metallurgist, Timken-Detroit Axle Co., Detroit, states that steelmaking practice has been developed to better control of grain size, and to some extent normality, making it possible to apply steels for certain uses formerly impossible. Such control in medium-carbon, plain-carbon steels permits drastic quenching without cracking, direct quenching of carburized alloy steels from the carburizing temperature with minimum distortion and maximum toughness, and greater toughness of highly hardened oil-hardening steels for shafts, springs, etc.

Commenting on other progress of the year, Mr. McMullan finds direct quenching of case hardened steels to be meeting with increasing favor. A number of new installations for gas carburizing have been made; gas carburizing and direct quenching combined minimize handling work. To promote uniformity of case on box carburized parts, there is a tendency to use individual containers or those more closely conforming to the size and shape of the parts, thereby reducing the amount of compound and time for heating up. Increased activity is noted on the part of producers of molten salts for case hardening with various percentages of nitrogen in the case.

More insulating firebrick is being used in furnace construction to reduce heat storage in walls and to cut down the time for bringing furnaces up to heat, Mr. McMullan observes. Close temperature control is required for many heat treating operations, but in others the necessity for close control is lessened, for example, fine-grained steels can be heated for quenching over a much wider range than the coarse-grained steels formerly used more extensively.

REFINEMENT in temperature control probably will come in uniformity of the work itself rather than at some particular point in the furnace where the thermocouple is located. Furnace developments claimed to give greater uniformity in this direction are continuous draw furnaces with a single burner outside the work chamber and a fan which circulates a large volume of hot gases. Baffles direct the gas flow through the work.

Controlled atmospheres are destined for wider application, Mr. McMullan predicts. Necessity for elimination of costly cleaning operations and production of better material eventually will lead to nearly all installations of any size for normalizing, annealing and heat treating, having atmospheric control.

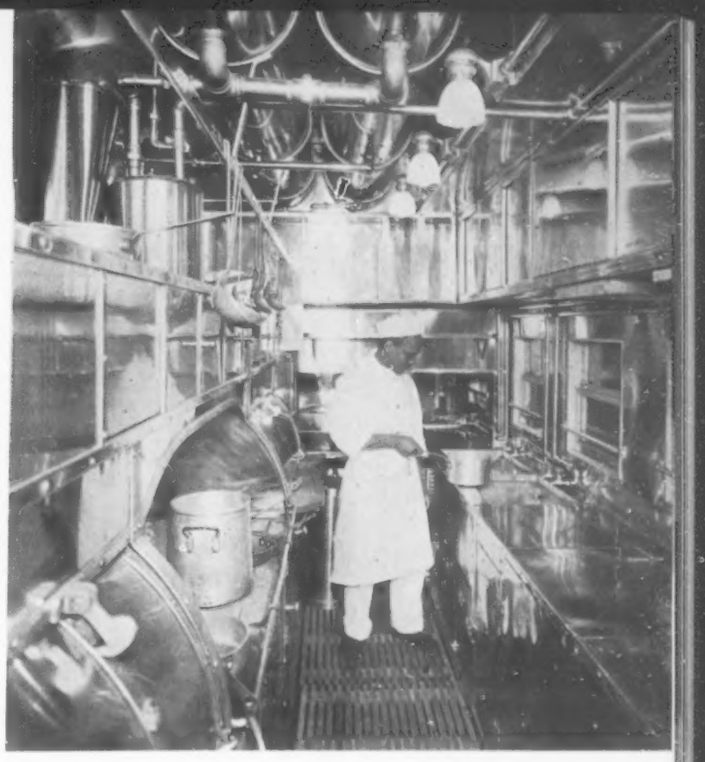
Design Factors Exert Effects

A problem in connection with heat treatment is to determine the boundaries within which the operation itself functions, concluded Mr. McMullan. Attempts to accomplish certain results by change in heat treatment frequently are made without any possibility of success because the answer lies in some other field, such as steelmaking, or design of parts. On the other hand, troubles may be blamed on the steel when proper heat treat-

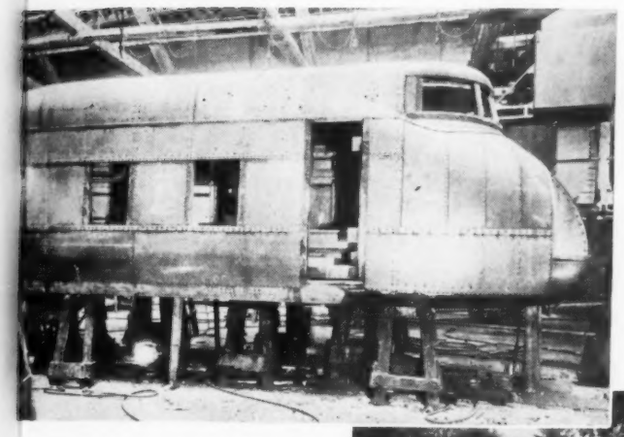
(*Please turn to Page 267*)

TRANSPORTATION

WILL streamline trains be the hoped-for salvation of railroad passenger business? Perhaps 1935 will supply a fairly clear answer to this question, but in the meantime it is interesting to observe how the trend to streamlining has aided suppliers of materials such as stainless and low-alloy steels, aluminum, and many other metals. On rail and road, on the water and in the air can be seen daily evidences of the contributions of engineers and metallurgists to the vast field of transport development.



WHILE MANY ARE FAMILIAR with the role of metals as far as exteriors are concerned, train interiors also offer a field where bright appearance and corrosion resistance are invaluable. Four new diners being built for the Missouri-Kansas-Texas railroad are equipped with kitchens and pantries resplendent in 18-8 chrome-nickel stainless steel, as shown in the illustration above. Practically all exposed surfaces are covered with this metal which is also used to line ice wells, refrigerator, water tanks, and to fabricate lockers. Three club cars operated by the same road are equipped with stainless steel soda fountains and back bars



STEEL OF THE low-alloy high-strength grade has been specified during the past year for newly designed, light weight railroad equipment. It is used in the new streamline unit shown above, several of which are currently under construction. Wide World photo

SID SEARS, enterprising distributor of gasoline, knows the value of streamlining and a bright, aluminum-paint finish on his trucks. The giant at the left carries 800 gallons. Staring at the reader from below is the almost-human face of Union Pacific's entry in the streamline derby. It is of aluminum, painted canary yellow and brown

AT THE LEFT is the 213-foot all-welded steel freighter, DOLOMITE I, recently placed in service on the Great Lakes—a far cry from the wooden sailing ships of another century

Forgings Makers Are Meeting Exacting Specifications

MORE exacting specifications for forgings, including closer tolerances to reduce finish machining and smaller sections with equal or higher physical properties, are exerting a profound influence on the forging industry. In meeting these problems, manufacturers of forgings are turning to controlled grain size steels and alloy type steels. In the heavier class of forgings, the tendency is toward larger sizes. Production of stainless steel forgings is noticeably on the up grade. Manufacturers of forging equipment are assisting the industry to meet the conditions of higher quality and lower cost by providing machinery and furnaces of greater productivity and efficiency.

Considerable progress in refinement of forging production methods was made in 1934, reports R. W. Thompson, chief metallurgist, Transue & Williams Steel Forging Corp., Alliance, O. Adaptation of controlled furnace atmospheres to forging furnaces correlated with automatic control of temperatures contributed to uniformity of physical qualities of forgings as well as improvement in machinability. The tendency toward light-weight construction with increased strength has imposed more rigid metallurgical control of production routine to guarantee the exacting specifications.

Electrolytic Pickling Gains

The electrolytic principal of pickling or cleaning drop forgings has received much attention and time of removing scale has been reduced as much as 50 per cent, says Mr. Thompson. Bright dips producing a silvery appearance show surface imperfections plainly. Probably the highly competitive situation confronting the drop forging industry will require the replacement of much obsolete equipment. During the past year, there has been a considerable increase in application of stainless steels for forgings and it is predicted that this year will see more of these types forged, particularly for heat-resisting applications.

L. E. Ruby, works manager, Pittsburgh Forgings Co., Jackson, Mich., states that his company has been typing forging die inserts commercially during the past year with satisfactory results. By this method, die impressions are forged in a drop hammer; since no machine finish is necessary on the impression, a dense and fine-grained structure is obtained in hardening, which gives longer die life. Automatic forging furnace control is being more generally used, he says. Equipment manufacturers are introducing more rigid and compact forging machines and presses, and these permit forging to closer tolerances, a factor which lightens the forging and reduces the amount of finish machining.

Aluminum alloys now are forged most successfully, and stainless steels can be forged as easily as ordinary alloy steels if temperatures are controlled carefully, Mr. Ruby asserts. A special die steel slightly increasing molybdenum and nickel contents is proving somewhat superior to the regular chrome-moly-nickel die steel. Attention in 1935 probably will be devoted to better furnace temperature control, increasing forging qualities, and lowering production costs.

SOME of the outstanding improvements in forgings in 1934 were in the direction of meeting increasingly exacting demands in connection with steam and electric power projects, a greater part of which were in shipbuilding, says the Bethlehem Steel Co., Bethlehem, Pa. To meet the demands for high-temperature use, the development of new alloy steels, capable of being forged and handled in heavy masses, presented a real problem, since in most cases higher properties with no increase in weight were necessary.

As a whole, state engineers of this company, advancement in forging has been in line with meeting more exacting service requirements. Remarkable strides were made in suitable materials and suitable methods of handling and heat treating them to operate with the same degree of safety which previously obtained under far less severe conditions. By no means of secondary importance are advances in forgings for the oil refining industry where higher temperatures impose most exacting requirements.

Increased use of slightly alloyed steels for forgings, permitting higher stresses and generally lighter construction, is mentioned by J. L. Cox, chief engineer, Midvale Co., Philadelphia. The following elements often are in very small proportions, but produce a disproportionately large effect upon physical properties. Larger forgings are being made from these alloys. More attention is being paid to protection of steel from oxidation in working and in treatment, resulting in construction of furnaces with controlled atmospheres. A comparatively new aid to economy is the all-metal recuperator for preheating the combustion air of furnaces.

More Known About Creep

The subject of creep is of lively interest, continues Mr. Cox, with efforts being made to evolve short-time tests. The extent and character of effect of alloying additions on creep strength is becoming better known. Knowledge is accumulating on methods for treating stainless steels of the 18-8 type to prevent carbide precipitation in the zone of 900-1200 degrees Fahr.

Manufacturers of forged parts are steadily growing to an appreciation of the value of controlled grain size in steels and the resulting control of hardening characteristics, contends W. G. Hildorf, chief metallurgical engineer, Timken Steel & Tube Co., Canton, O. Importance of uniformity and accuracy in size and section of stock likewise is of increasing interest. The forging operator can cut his multiples closer to finished forging weight; he can depend upon the die being filled; he will have minimum flash; and he can count on a high percentage of acceptable finished pieces.

Similarly, says Mr. Hildorf, controlled accuracy and uniformity in stock furnished by the steelmaker will reduce machine work required on the forgings. Stock which has high quality surface finish requires practically no chipping or grinding to prepare it for forging and a minimum of machining to finish it after forging.

THE task of forge plant managers during the past year has been to make better deliveries of higher-grade forgings at lower prices, state engineers of the Chambersburg Engineering Co., Chambersburg, Pa. The answer is more efficient production, a need which equipment builders have met with better forging machinery. Some shops have installed unusually large steam and board drop hammers, which, with tremendously increased sections, masses and bearing surfaces provide constant accuracy and alignment and give part of the answer to the short work week. Alloy irons and steel have figured prominently in this construction.

In forging machines and presses, notably the former, there has been a

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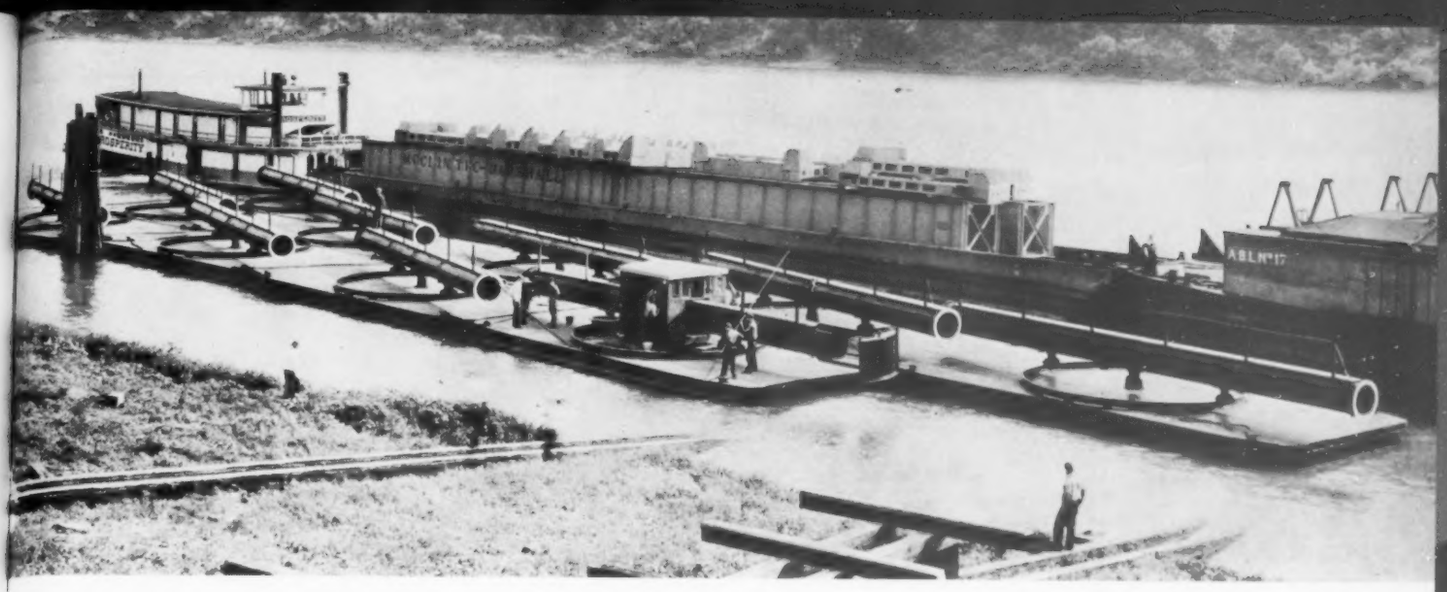
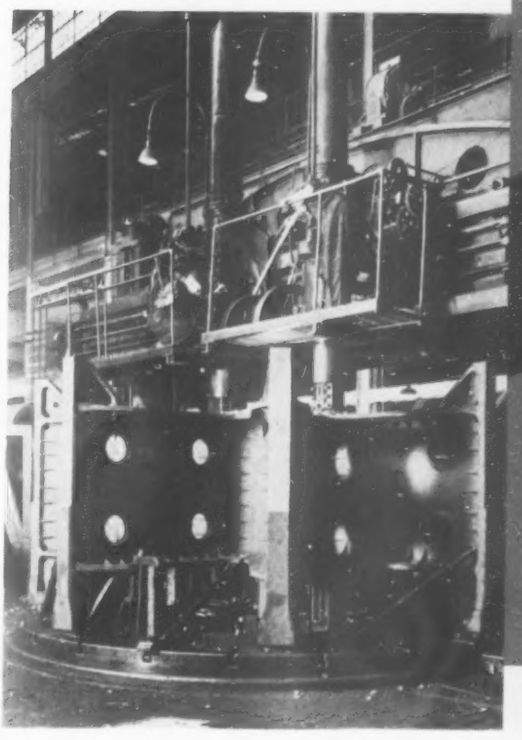


THESE TEN steel pontoons, each carrying a 50-foot section of 34-inch welded dredge pipe, recently were fabricated for use on the Missouri river improvement project at Fort Peck, Mont. A barge load of fabricated steel for the "Huey P. Long" bridge across the Mississippi river at New Orleans is shown alongside

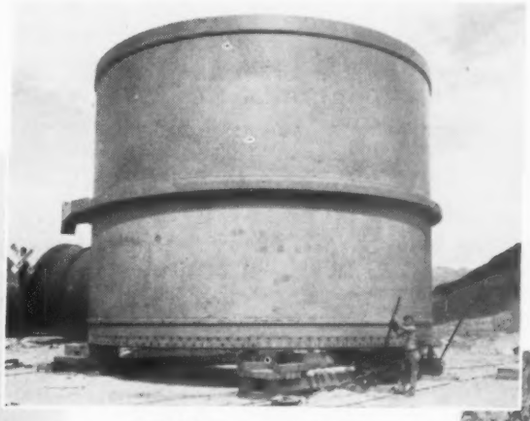
PUBLIC WORKS PROJECTS

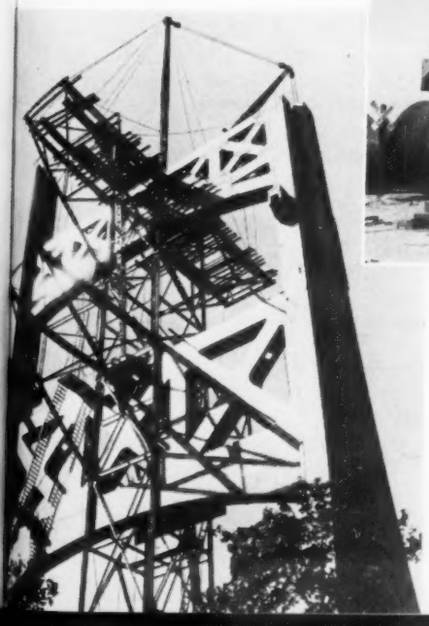
BILLIONS of federal funds have been pouring into public works projects throughout the country as a generous Uncle Sam has labored to provide jobs for unemployed. A good share of these dollars has gone to suppliers of metals and equipment for these undertakings, most of them bordering on the stupendous in nature. Bridges, hydroelectric and irrigation projects, and a host of other improvements have meant a market for steel alone to the extent of about 1,500,000 tons; have imposed strenuous demands upon designers and fabricating facilities.



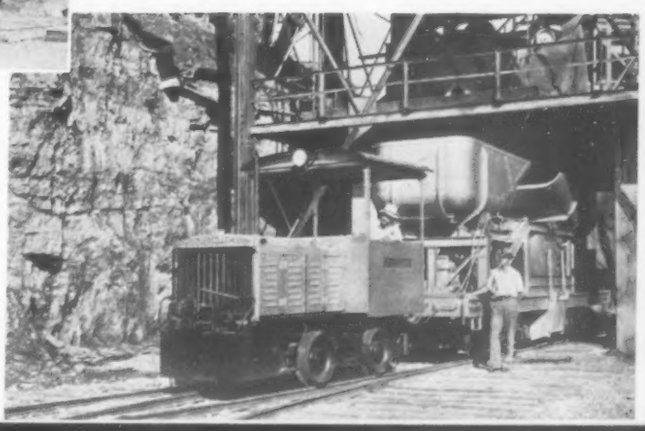
AT THE RIGHT a 7000-pound cast steel spider for a Boulder dam hydroelectric generator is being machined. Tools of high capacity and capable of precision work are required

BELOW IS SHOWN one of the massive towers for the Triborough bridge in New York, now being built, and considered by some the most notable piece of riveted steel construction erected in 1934





WELDED PLATE 2 inches in thickness is used in the 30-foot diameter section of main conduit for Boulder dam, shown above. It was fabricated at a field plant near the dam and weighs a mere 150 tons. At the right is a 10-ton gas-electric locomotive for hauling concrete at the Norris dam on the TVA project in Tennessee



Trend in Stampings Toward Larger, Complicated Designs

MUCH larger stampings, many of them of such complicated design as to challenge the best ingenuity of the stamping industry, were produced in large volume during 1934. Other noteworthy developments included an increased use of welding in assembling stampings, introduction of new specialized annealing equipment, great progress in the stamping and forming of stainless steel and the development of improved mild steels, in wider and longer sheets and strip.

This progress also was accompanied by an improvement in the prosperity of the industry. Commenting on the lengthy period in which job stamping shops operated without profit or in the red, the general manager of a large pressed metal manufacturer believes that conditions have improved. For the first time in many months, he says, the job stamping shop has begun to appreciate the sweetness of a small profit. But there is an exception. Increase in automobile production, with attending reduction in prices, has forced improved methods, but from a job stamping standpoint the automobile buyer has forced lower prices to too great an extent; as a result, automobile stampings have become a very unattractive part of the business of many large and reputable stamping manufacturers.

More Stainless Steel Stampings

Stainless steel is coming into wider use, says this executive, although there still is a lack of expert knowledge covering all phases of the fabrication of stainless steel by the stamping process. But more difficult drawings and formings constantly are being produced. He continues:

"It seems that our principal problem is not so much what we do with the stainless steel as the way we do it. Correct tools made from material particularly adapted to the use of stainless steel, set-up in presses with the correct speed and operated with the correct lubricant are 90 per cent of the answer in successfully fabricating stainless metals. Incidentally, all of the elements mentioned act differently than in the use of ordinary carbon steel."

Another outstanding trend in the stamping industry, commented on by a large heavy stamping manufacturer, is the increase in the use of welding in assembly. This means considerable change in the design of the stampings involved. Assembly of parts by welding has made it possible in many cases to use lighter-gage steel for the stampings and still get the required strength in the assembly. In some instances, this use of welding in assembly has permitted a reduction in the size of the parts and also has permitted the making of assemblies not possible by other methods, as for instance, in connection with boxed-in members. In many assemblies now made by welding there is no convenient way of getting the dies into the parts for riveting.

A NEW and complicating factor that definitely has sprung up during 1934 is that industrial designers are working with manufacturers of products in which stampings are required, says J. Stanitz, chief engineer, Youngstown Pressed Steel Co., Youngstown, O. These designers are beautifying their products with the result that the stampings going into them are becoming more and more complicated. In cases where the artist is not quite willing to co-operate with the stamping manufacturer to make the design feasible from the standpoint of stamping production, the poor design of the stamping has resulted in great difficulties and higher cost. In this respect, Mr. Stanitz believes that commercial designers have a great deal to learn.

In reference to stainless steel, Mr. Stanitz states that this metal finally can be drawn, formed or shaped without any difficulty. Several new plated and fused coatings that have come on the market are not yet entirely satisfactory, says Mr. Stanitz, as during the deep drawing operation the coating is likely to flake off. Sheets prefinished with a painted grained surface are being successfully used for forming automobile instrument panels and air conditioning cabinets and similar parts where graining and painting of the finished product would be difficult.

Improved Stamped Brake Drum

Improvements have been made in clutches and drives for power presses, but basically the press equipment available is unchanged. Mr. Stanitz notes a continued trend toward the development of stampings to replace products made from other materials or by other processes.

Although some automobile manufacturers are using cast iron or composite steel-cast iron brake drums, many automotive engineers are using stampings for brake drums, comments Charles L. Williams, Kelsey-Hayes Wheel Co., Detroit. Further developments that will give steel brake drums many of the desirable characteristics of the cast-iron drum, while still retaining the steel drum's advantage in cost, are expected by Mr. Williams. Some of the difficulties to be overcome in the steel drum are stiffness and freedom from bell-mouthing; ability to dissipate heat also is a factor. Much is expected from a new drum designed by this company, made of several steel stampings welded together, now being tried out experimentally.

Brake drums for the 1935 Pontiac car, Mr. Williams says, are being cold stamped from steel containing 0.15 to 0.25 per cent carbon, 1.20 to 1.50 manganese, 0.045 sulphur, 0.045 phosphorus and 0.30 silicon.

Tie Rods are Cold Stressed

An important development in press equipment, Mr. Williams states, is the cold stressing of the tie rods by means of hydraulic jacks and placing shims of suitable thickness between uprights and bed or the crown. He believes this is much better than the old method of heating the tie rods with a torch until the rods elongate and then taking up on the nuts and allowing the rods to cool and shrink the press parts together. The cold stressed rods can be stressed a definite and known amount which will give the crankshaft and other major parts of the press overload protection and prevent most of the costly repairs resulting from occasional overloading of the press, with resultant failure from fatigue.

RECENT trends in the design of parts to be made from steel stampings call for the drawing of metals to a greater depth than previously encountered, comments A. G. Seger, plant engineer, Surface Combustion Corp., Toledo, O. This increased severity of the drawing operation requires considerable attention to the metallurgical side of stamping controls as well as to mechanical production. Such a condition arose in connection with a particular steel stamping used in the manufacture of automobile wheels. Considerable cold working was required in the production of these stampings so that annealing was essential in order to

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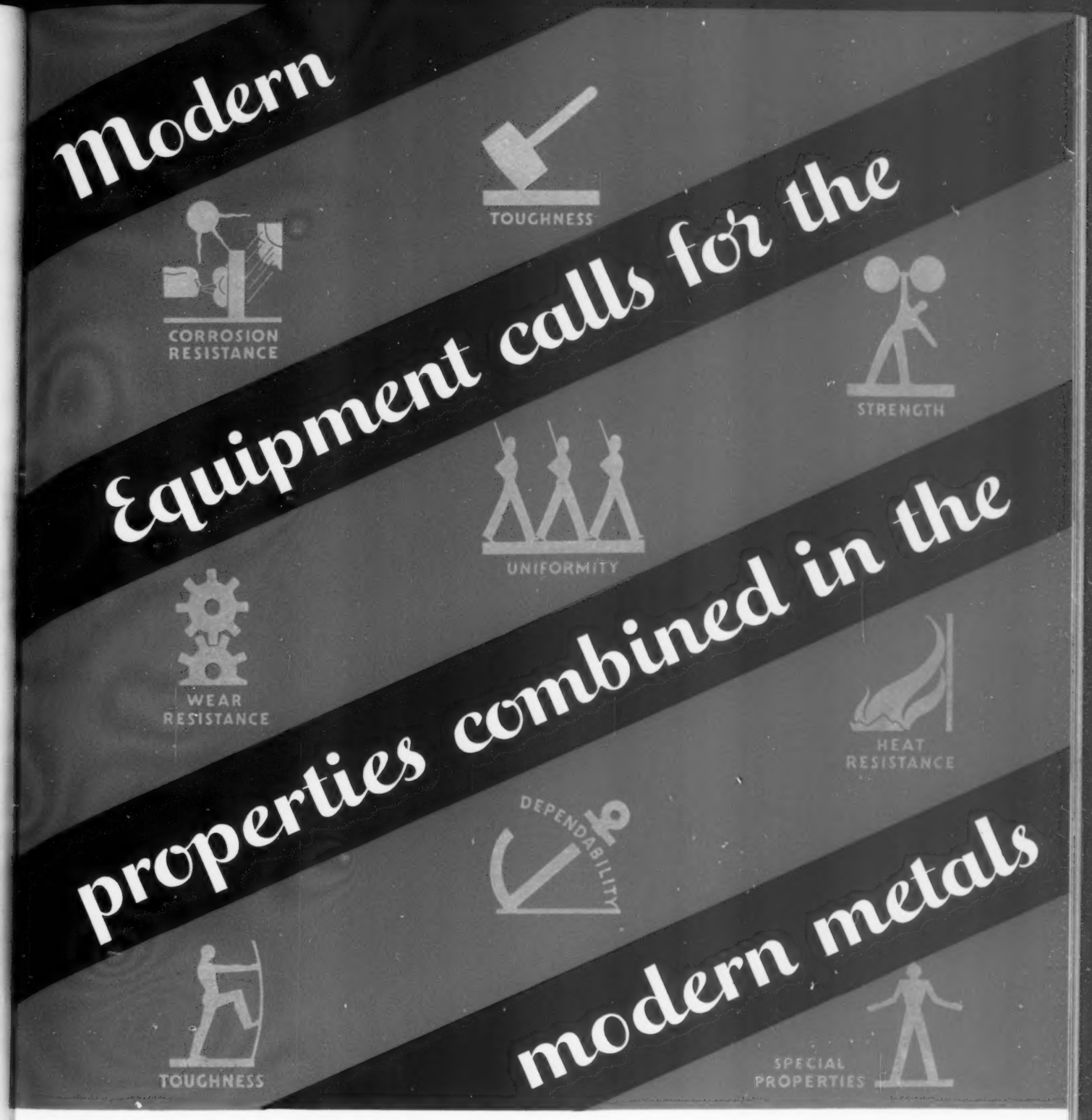

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Welding Is More Generally Accepted in All Fields

USE of alternating current welding, particularly for penstocks and plate work in hydraulic projects, and resistance welding of high tensile and special steels in new transportation equipment stand as highlights in 1934. Welding in shipbuilding received a tremendous impetus. More general acceptance of welding was noted in all manufacturing fields.

Research brought about improvement in weld quality and development of better electrodes; welding tests and qualification of welders were standardized further. Flame cutting and machining were utilized more extensively, with a recommended practice for cutting being adopted; and advantages of hard surfacing was recognized in many fields. One of the problems in welding is the difficulty of residual stresses and the proper method of stress relieving. Riveting fabrication was improved by adoption of new types of rivets, and use of closer tolerances.

No revolutionary changes in welding processes occurred in 1934, but the year witnessed a multitude of minor improvements in equipment, electrodes and methods, declares J. C. Hodge, Babcock & Wilcox Co., Barberton, O. In arc welding, greatest interest centered upon the most desirable type of current—D.C. or A.C. In Mr. Hodge's opinion, A.C. is superior for certain types of welding, especially automatic welding of longitudinal butt joints in pipe or drum sections, at the ends of which the magnetic disturbance of the arc is severe with D.C. There are other minor advantages of A.C. welding, also some disadvantages.

High Tensile Steel Used

In the pressure vessel field, the most important change was introduction of high-tensile steel plate having a minimum tensile strength of 70,000 pounds per square inch, as compared with the 55,000 pound per square inch firebox and flange boiler plate. Considerable saving in weight is effected and all requirements of Class I welding are met. A large number of pressure vessels were fabricated for service in the low-temperature oil dewaxing process. Because of low impact values of plain carbon steels at subzero temperatures, these vessels were constructed of special steels, the more important being a 2 per cent nickel steel.

Use of X-ray examination for nondestructive testing of welded joints, particularly in pressure vessels, has increased steadily. Today there are approximately 16 manufacturers with facilities for this type of inspection, and it is estimated that about 3000 vessels, representing some 400,000 linear feet of joints, have been examined.

A number of fusion welded penstocks or aqueducts are in process of fabrication, the most important being the penstocks for Boulder dam. According to Mr. Hodge, it may be estimated conservatively that over 100,000 tons of steel plates have been ordered for large-diameter penstock piping for various federal and municipal hydraulic projects.

Arc welding now is being applied to increasingly large quantities of high yield strength or high tensile steels of low alloy content, such as cromansil, manganese-vanadium, copper-molybdenum steels, and the like. These steels, says Mr. Hodge, are being used to advantage in structures where saving in weight is of prime importance, a considerable quantity being utilized for railway equipment.

Welding Gains in Steel Mills

Announcement of a motor-generator A.C. welding machine marks the departure from the custom of using transformers, reports R. E. Kinkead, consulting engineer, Robert E. Kinkead Inc., Cleveland. At present, there appears to be a legitimate field for both D.C. and A.C. arc welders. The past year has shown the welding industry the importance of the consumption end of the business. In the latter months of 1934, welding rod consumption reached about 5 million pounds per month.

In the steel industry, acceptance of welded steel construction has gained. Several rolling mills now being built involve considerable welded construction. Mr. Kinkead points out, however, that welded construction does not eliminate the need for steel castings and this understanding has permitted the choice of materials to be put on a more rational basis. The greatest need of the welding industry is for welding to be handled more like other technical processes are handled so that costs may be kept down in spite of mounting labor and material costs. Incentive systems and correct manufacturing methods will get more attention than ever this coming year.

Large A. C. Units Important

It is the opinion of A. M. Candy, industrial motor engineering department, Westinghouse Electric & Mfg. Co., East Pittsburgh, that the greatest engineering achievement in the electric welding field last year was the introduction of A.C. arc welding transformers of large capacities from 500 to 1000 amperes rating. These transformers are arranged with a unique method of current control which gives a continuously sliding adjustment of current from minimum to maximum by means of a moving iron shunt designed to eliminate mechanical noise.

Another feature incorporated in these transformers is an automatic low-voltage protective control system whereby the operator is protected against high open circuit voltage in the order of 100 to 110 volts by means of a switching equipment which reduces the voltage approximately 40 volts after the operator ceases welding.

DESPITE remarkable strides of welding in the last decade, and particularly in the last few years, W. Spraragen, president, Spraragen Engineering Corp., New York, believes it is a conservative estimate to state that welding has not advanced more than 25 per cent of its ultimate possibilities. Applications of welding in many cases are comparatively simple, but others involve highly complex chemical and metallurgical problems. The American Bureau of Welding has under way more than 50 investigations on specific fundamental subjects in the welding field.

There has been a notable trend toward A.C. welding, particularly for heavy work. This impetus was received in fabrication of Class 1 pressure vessels where use of A.C. automatic welding in combination with modern heavily-coated electrodes resulted in denser and more uniform deposit of weld metal with less disturbance in the arc, as compared with D.C. New A.C. equipment undoubtedly will be a factor in still further advances in this type of welding. Mr. Spraragen warns that the rapid popularity indicates probably the pendulum will swing too far and A.C. will prevail for lighter sections and in places where D.C. would do as well or perhaps better.

New problems are coming to the front constantly. More is needed to

(*Please turn to Page 270*)

Enhanced Properties Extend Uses of Modern Castings

SPECIALIZATION has been the keynote of progress in the foundry industry over the past year—specialization not only in analyses but in heat treatment, design and application of castings as well. Nickel, molybdenum, chromium, copper and even titanium, once alloying elements with which the foundryman was familiar only in textbooks, have become accepted in a practical way to aid in the production of ferrous castings with special properties such as toughness, lightness with strength, corrosion resistance, controlled grain structure, impact strength and others.

Metallurgical advancement naturally has paved the way for new adaptations of castings and producers have not been lax in this respect. As pointed out by Dan M. Avey, editor, *The Foundry*, Cleveland, and president of the American Foundrymen's association, general adoption of cast brake drums for automotive service, which had its incidence several years ago, full recognition of advantages of the cast crankshaft and camshaft, and the introduction of all-cast valves are typical of a trend in the automotive industry, credit for which must go partly to the ingenuity of foundry technicians.

Cast Iron Pavement

Roadways surfaced with cast iron blocks, an idea originally conceived in England, have been studied at least in an experimental way, Mr. Avey notes. STEEL has presented two articles (Aug. 6 and Nov. 26) on this development which is being investigated at the University of Minnesota, and gives some promise of providing an outlet for excess blast furnace and foundry capacity.

Mr. Avey sees the outlook for 1935 encouraging. While a large part of the expected demand is predicated upon success attending efforts to stimulate building, durable goods manufacture and railway rehabilitation, actual business available and on inquiry among foundries is higher than for several years past. Automotive, agricultural implement, stove, radiator and furnace, and pipe production lead in the march toward better operation in the industry.

With this cheerful expression of what lies ahead, it may be useful to examine in some detail the trend of technological development over the past year, classifying comments into the various types of castings represented—steel, malleable, gray iron, and nonferrous materials, together with various related materials.

AS AN example of the increase in the use of alloys in the foundry, it is interesting to note that consumption of nickel in 1934 increased more than 50 per cent over 1933. A. G. Zima, specialist in the steel castings industry, International Nickel Co. Inc., New York, states that the increasing tendency of railroads to look toward lighter equipment as a partial solution of their problems has resulted in considerable interest in cast nickel alloy steels for truck frames, bolsters and locomotive castings. Low and medium carbon 2 per cent nickel steels for locomotive castings and low-cost pearlitic manganese steels containing 1.0-1.5 per cent nickel for light weight car castings are being produced in several foundries.

Mr. Zima also points to the more widespread use of case-hardened cast nickel steels as an economical means of filling requirements where die or machining costs are excessive, such parts as gears, pinions, complicated bearing housings and miscellaneous parts requiring a hard, wear-resistant surface supported by a strong, tough core being commonly made of cast low-carbon steels containing 1.75-5.00 per cent nickel. The mining industry and other fields where abrasion-resistant castings are required, as well as in those industries demanding steels for low-temperature applications, have experienced good results with castings alloyed with varying amounts of nickel.

TWO instances of the steady growth in certain trends in foundry practice which have been obvious the past year, as well as the few years previous, are cited by F. A. Melmoth, vice president, Detroit Steel Casting Co., Detroit. One is the increased application of special steels to casting purposes, where the demand for lightness and increased strength has necessitated the use of alloys to an ever-widening extent. The second is recognition of the value of specialized heat treatment, suiting the castings definitely to the job. Far more castings are being given heat treatment of a controlled type than was proportionately the case in previous years. One example of this specialized heat treatment is seen in differential heat treatment to produce varying degrees of hardness from point to point in the casting.

Production of exceptionally large castings for Boulder dam is seen by John Howe Hall, technical assistant to the president, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., as one of the important achievements of the year in foundry circles. One of these castings (STEEL, July 16), complete with gates and risers, weighed nearly 70,000 pounds.

In the alloy steel casting field, Mr. Hall detects a decrease rather than an increase in the number of different alloy steels being produced, with the industry aiming to standardize on certain fairly definite compositions. In a general way, types of alloy steels being cast correspond with the several classes covered in the American Society for Testing Materials specification for alloy steel castings.

New Specification Is Milepost

"The adoption of a new tentative specification by the A.S.T.M.," says Mr. Hall, "covering carbon steel castings for various classes of service, is a milepost showing the progress that has been made in improving physical properties of cast steel."

Acquisition of foundry skill in the manufacture of alloy steels, and the development of economical designs for cast steel parts to replace built-up structures are significant developments of 1934, in the opinion of R. A. Bull, consultant on steel castings, Chicago. He also sees the industry looking forward confidently to a much better consumer demand for its product in the coming year.

ANOTHER alloying element which has been gaining wider acceptance in the foundry is molybdenum which has been demonstrated to increase hardness and strength for any toughness, or conversely to increase toughness for any particular hardness and strength. A growing use for molybdenum in steel castings is for parts, such as valves and other castings for high-temperature work in both the oil refining plants and steam power plants, according to the Climax Molybdenum Co., New York. Molybdenum's property of slowing down the transformation point of steel on cooling is valuable to foundrymen, since it tends to reduce cracking considerably. In addition, molybdenum steels in the heat treated con-

dition are reported to have improved machinability. Types of molybdenum steel castings produced in 1934 include dipper teeth, bucket lips, crane wheels and sprockets, high-temperature valves and fittings, and tubing connections and frames for the new high-speed trains.

According to the Climax company, molybdenum in malleable iron yields three several significant advantages, including less cracking of intricate castings in the mold, less loss through breakage during tumbling operations, and production of a uniformly white iron due to the hardening properties of molybdenum. Uses of malleable iron containing molybdenum include ball mill liners, pulverizer parts, coke screens and grizzlies, and coffee mill burrs.

Ability of molybdenum to improve toughness, uniformity, wear and heat resistance, makes its use in gray iron castings likewise advantageous. Parts in this category number crankshafts and camshafts, cylinder heads and blocks, light and heavy gears, machine tool frames, rolls, grate bars, valves, pump bodies, dies and the like. Only small amounts are needed in this iron, percentages varying from 0.07 to 0.20.

IN THE malleable iron industry, while noteworthy developments have been few, the demand for prompt deliveries has accelerated the installation of the small car-type annealing oven, in the opinion of the Enrique Touceda, consulting engineer, Albany, N. Y., and consultant for the Malleable Iron Research institute, Cleveland. With this equipment an anneal can be made safely in four days, even in the case of heavy work, while one company has developed an electric malleablizing furnace in which annealing may be completed in 72 hours on castings approximately ½-inch thick.

Mr. Touceda also reports that a number of plants have installed recuperators on air furnaces, with substantial saving in coal and melting rate of nearly 5 tons per hour. He visions the coming melting equipment as unquestionably the rotary powered-coal furnace, of which there are at present two types—the Brackelsberg and the Sesci. The latter type is used abroad, 35 units being installed in 25 different plants for melting gray iron, malleable and steel. It is reported that shortly some of these furnaces will be installed in this country. Important savings can be made in fuel, time and cost of mixture.

Development of copper-bearing malleable iron appears an important step forward, according to H. A.

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Die Castings, Improved in Quality, Find New Uses

DIE castings gained many new applications during 1934. Pronounced trend toward improved quality, superior producing methods, more complicated designs and a wider variety of physical characteristics was noted. At the same time attention was focussed on certain factors which restrict the range of brass die castings.

Regarding brass die castings, John E. Freeman Jr., assistant technical manager, American Brass Co., Waterbury, Conn., says that the higher melting point alloys cannot be cast due to limitations of die steels available. Because brass containing 60 per cent copper and 40 per cent zinc has the lowest melting point among commercial brasses, it is the most widely used for die castings.

Absence of steels having long life at the high temperatures in this process also is commented on by William W. Sieg, Titan Metal Mfg. Co., Bellefonte, Pa., who says this lack is a restrictive factor. Progress in other directions is reported by Mr. Sieg, such chines which have capacity for making pressure die cast brass parts with maximum weight of 11 pounds. He also stresses the value of the trend toward semiautomatic machines. Development of gas and electric furnaces in which the temperature of the brass is controlled automatically also is a factor that assists the industry.

High Strengths Are Obtained

One reason why the brass die casting field is broadening, says Mr. Sieg, is that thin sections whose production by the sand casting or forging processes is difficult can be made satisfactorily as die castings. And despite the die steel limitations, Mr. Sieg points out that the industry is able to produce castings of high strength. He mentions the improved brass alloys which have tensile strength of 50,000 to 60,000 pounds per square inch. He cites an 80,000-pound tensile strength copper-silicon-zinc alloy, and an 80,000-pound nickel silver, containing 15 per cent nickel and presenting a silvery white appearance.

Discussing brass and copper base die castings, Charles Pack, assistant to president in charge of research and development, Doehler Die Casting Co., Toledo, O., refers to the production of castings from material with tensile strength in excess of 90,000 pounds per square inch. Mr. Pack confidently expects the field of applications for copper base alloy die castings will increase greatly during the coming year.

With reference to die castings in general, Mr. Pack says that size limit practically had disappeared, inasmuch as die castings 4 and 5 feet long now are quite common. During the past year development of large die castings has progressed extensively. He cites as a typical example a complete sewing machine frame, including the motor housing, die cast in aluminum.

One of the developments in 1934 was a new type of nickel plating bath into which, says one important producer, zinc base die castings may be introduced without danger of streaking and in which the castings are plated with an unusually bright nickel finish which makes an excellent base for subsequent deposits of chromium.

BETTER control of purity by manufacturers of high grade zinc is regarded by N. A. Parker, Parker White-Metal & Machine Co., Erie, Pa., as one of the important developments of the year. This advance, together with improved ability on the part of the castings manufacturer to maintain this high purity in the finished product, has resulted in better die castings. Other factors in improving die castings are the automatic control of metal temperature and die temperature, the speeding up of production machines and the adoption of automatic machines with capacity for 1200 to 1500 shots per hour. All these factors have resulted in greater uniformity and quality than hitherto possible. Another phase of this progress pointed out by Mr. Parker is the elimination of the multiple cavity die, thus reducing die cost and, in turn, opening new fields for production.

To fulfill demands for die castings of improved surface condition and solidity and freedom from contamination, necessity for replacing obsolete equipment is great, says William M. Lester, Lester Engineering Co., Cleveland. The year

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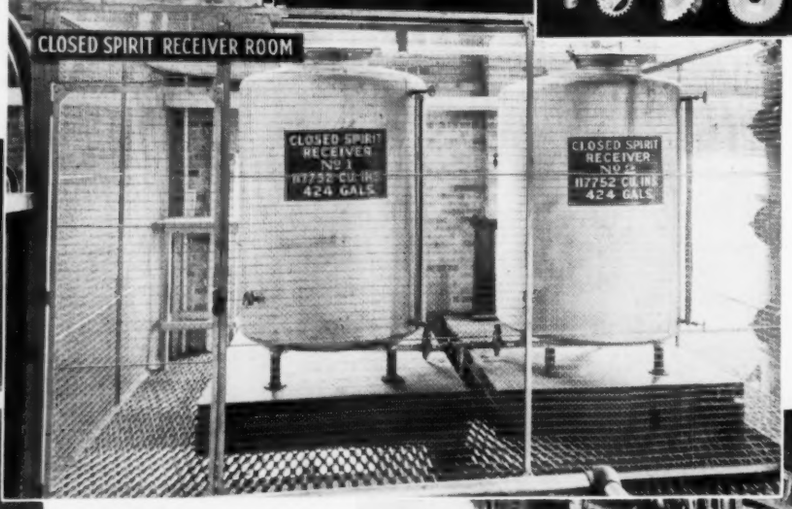
PARTS AND PARADE

ANNEALING TIN PLATE, 90,000 pounds at a time, is accomplished in this large annealing box, a combination of welded plates and castings. A leading steelmaker recently ordered 12 of the boxes for a new cold-rolled tin mill

WITH the development of new and improved materials must come advances in equipment for processing and fabricating. Competition between materials, parts and processes will be keen in the effort of each sponsor to be sure that his goods or services are utilized to the fullest and soundest extent. Leaders of the parade of progress today may be in the ranks tomorrow, so rapid is the transition of a new idea from the drawing board to the plants of industry.

NOT A PEN for Mayville mediums is the cage below, but an example of the use of nickel in tanks for storing and weighing freshly distilled gin. The tin can sealer at the right makes generous use of zinc die castings, as may be seen in the disassembled view

A CHICAGO HOTEL restaurant keeps entrees hot by use of this cooker, sheathed in brilliant, easy-to-clean stainless steel. Dishes are placed on a revolving table and make one turn around gas burners inside, being ejected automatically. The answer to many a chef's problem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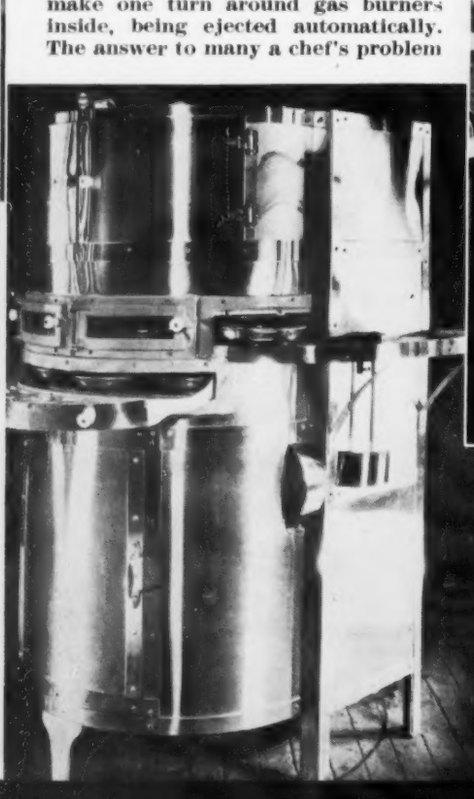
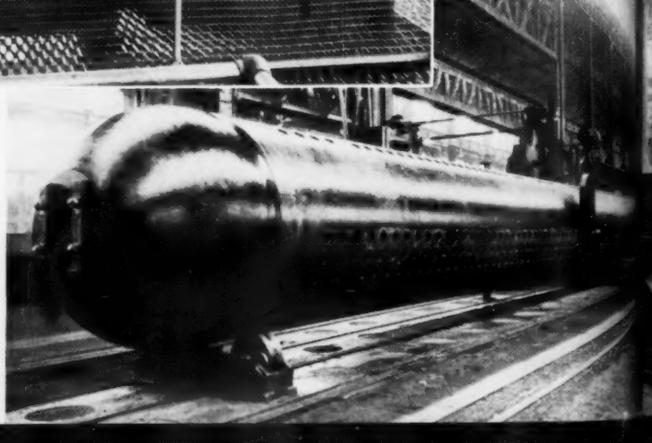
CLOSED SPIRIT RECEIVER No 2
117752 CU. INS 424 GALS.

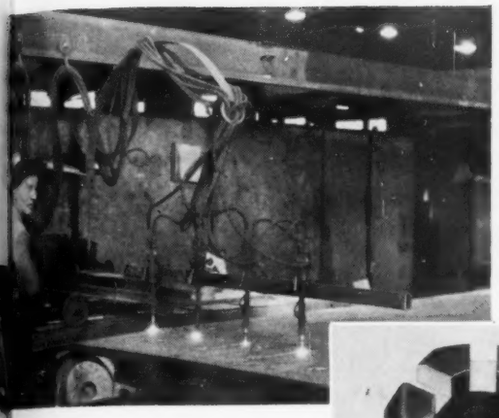


BOILER DRUM forgings upward of 60 feet in length, one shown at the right, are hammered down from a single 392,000-pound ingot in a 14,000-ton hydraulic press

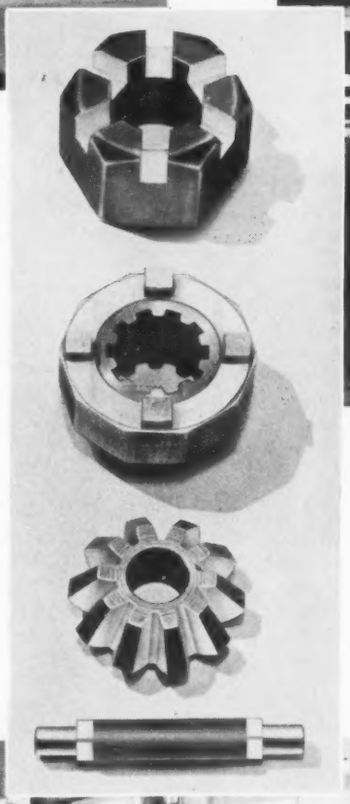


PROCESSES IN THE OF PROGRESS

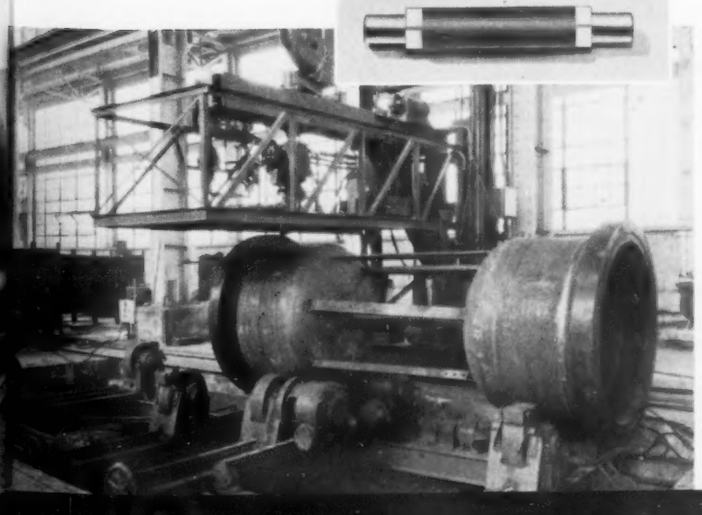
PRESSES GROW heavier each succeeding year and during 1934 installations of presses such as the 500-ton unit shown at the right, stamping out steel furnace sections, were more numerous



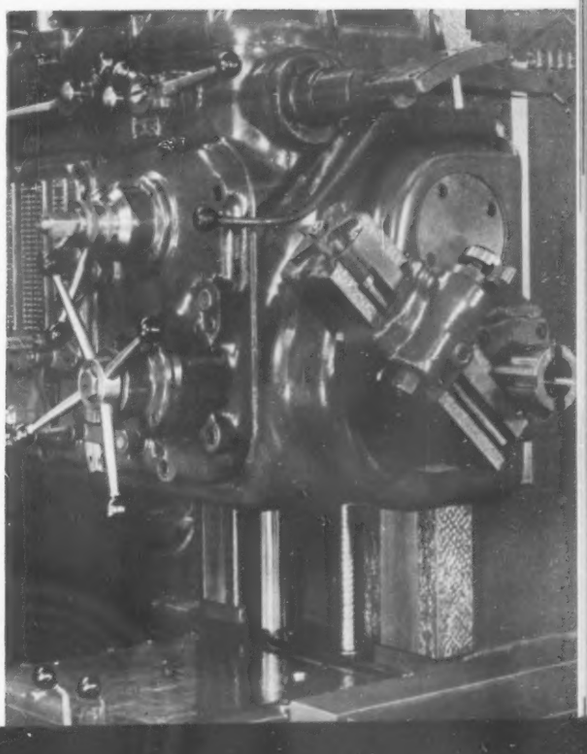
EXTRUDED FORGINGS, an outgrowth of shellmaking practice, now have many industrial uses. At the left is a vertical hydraulic piercing press; one pressman is holding a heated slug while the other two remove a pierced or extruded piece . . . In the field of machine tools, centralization of controls has been a boon to operators, and the illustration below is a striking example of clever grouping of all controls on a combination boring, drilling and milling machine



SILENT CUTTING by the intense heat of the oxyacetylene torch has lent new facility to fabrication of steel plate. Above is an adaptation of gas cutting, the pantagraph machine which cuts four pieces simultaneously . . . New strides in electric welding include the use of alternating current in high-production work, such as shown in the illustration below, a welding machine complete with motor-driven rolling device



BROACHING has made rapid strides during 1934 in the machine tool field. At the left are four parts produced by surface broaching



Surface Broaching Hailed as A Significant Development

EMERGING gradually from the doldums of the past several years and attendant financial impairment, the machine tool and related industries show an impressive design development record. That ideas were not smothered under the cloak of depression is revealed by 1934 offerings of new equipment. Consider, for example, surface broaching which probably is the most significant progressive step in manufacturing processes. Its advent in industry is hailed by production engineers and manufacturing executives.

Particularly pertinent is the comment of A. C. Danekind, manufacturing general section, General Electric Co., Schenectady, N. Y., who observes that surface broaching and precision boring and turning of ferrous metals are receiving increasing favor over older and more conventional methods of machining. The increased interest in the former process is the direct result of extensive engineering effort reflected so clearly in marked refinements in broaching equipment and broach design. Attractive operating characteristics of precision boring and turning equipment, he says, have been made possible largely through the advent of cemented carbide and other hard tipped tools.

Flexible Equipment Preferred

Subnormal business with attendant small quantity orders has brought about an increase in the use of flexible, general-purpose equipment in preference to higher priced high-production units, Mr. Danekind asserts. In this connection turret lathe manufacturers have made a notable contribution. Such refinements as antifriction bearings, direct motor drives, simplicity of operating controls, wider ranges of spindle speeds and feeds, hardened and ground ways, and greater ruggedness and rigidity have substantially increased the scope of economical usefulness of this type of equipment. In addition to these features a turret lathe offers comparatively low tool and set-up costs which makes it particularly attractive in meeting day-by-day requirements, he believes.

Another who sees a decided increase in the interest in external broaching is Tell Berna, general sales manager, National Acme Co., Cleveland. More will be heard about it in 1935, he says. There has been a strong tendency to refine existing machines and methods to simplify their operation, to make it easier to change from one set-up to another and to reduce idle time.

Particularly interesting also is Mr. Berna's assertion that customers are likely to ask for some measure of standardization of control in future machine tools, so that a range of sizes and even various makes of tools of one kind can be set in line. Thus an operator can step from one to another and find his clutch lever, the stop button, and feed lever in relatively the same place on each machine. This, Mr. Berna explains, not only would provide safety but also would make training of operators easier—and we are going to face a decided shortage of all-around mechanics in 1935. There is no reason why a ½-inch machine of a certain kind should have all its controls arranged differently from its 3-inch big brother.

Better Lubrication Developed

Continuing, Mr. Berna asserts that better lubricating systems have been developed, and should be studied carefully by designers and buyers alike. Commonly taken for granted, they have a great deal to do with net production. As machine tools become potentially more productive, there is increased emphasis on causes of idle time.

In his observation he sees an unusually attractive field for further research and development in the most effective use of coolants. They bear the same relation to cutting tools that lubricating oil does to bearings and gears of a machine. Few shops, according to Mr. Berna, are equipped to clean cutting oils properly. The coolants soon become loaded with minute particles of grit and metal, and form a most effective lapping compound. As increased funds become available for capital investment, he believes this point should have careful consideration.

CHIEF among recent developments in machine tool design and application in the automotive industry, says a summary of progress prepared for STEEL by Chevrolet Motor Co., are electrical tool control and the hydraulic system by which feeds and clamping of work in position are controlled. By means of these two developments it has been possible to increase production materially, but more important still is the fact that the machine operators are saved much manual labor, only a touch of a button or lever being required to make the complete cycle.

Broaching in Automobile Industry

In line with the foregoing comments, the Chevrolet summary credits external broaching with much progress and sets forth that machines used in this process are rapidly replacing the lathe, the milling machine and the grinder. Advantage of this method of removing stock is obvious, because the amount of material to be taken off can be divided up among many more teeth. This effects a savings not only in tool costs but in machine up-keep as well. The reason for this is quite apparent, as practically only one movement of the tool is necessary, while in other types of machines, movements are required in several directions—which means more gears and other parts to wear out. An example of this is Chevrolet's experience in broaching connecting rods and caps, as against the old milling machine method. The broaching process performs these operations at one-sixth the cost of milling, has saved 90 per cent in floor space, reduced upkeep and produces much more satisfactory work. There is no doubt, the Chevrolet company declares, that broaching methods in the future will supersede, to a large extent, other types of machines.

THE summary points also to progress in cutting tools which have made great strides toward higher production with the use of tungsten carbide. This material has made it necessary to design machines with much higher feeds and speeds, requiring rigid construction in order to reduce vibration and shock to a minimum. This, of course, has been a boon to machine tool builders and has reacted favorably in the development of antifriction bearings, pre-loaded ball bearings and many fool-proof types of oiling systems.

Another forward step is the use of diamond tools for external and internal finishes, and a much more extensive use of these tools in the future is indicated, the summary states. Well worth mentioning is the recent development by the Norton Co., Worcester, Mass., of a new material, boron carbide, claimed to be harder than anything except diamond. Present applications include its use as abrasives and as inserts in sand blast nozzles.

In general, the Chevrolet report

concludes, greater progress has been made in cutting costs and reducing manual labor in the last few years than ever before. Materials handling costs have been reduced appreciably by the extensive use of monorail, belt and roller conveyors.

J. R. Weaver, works equipment engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is of the opinion that machine tools now are more efficient than they ever have been in the past. He believes that industries in general still are a little cautious in replacing inadequate and obsolete machine tools due to the fact that they have not determined what the buying public will demand when we are back to normal again.

Sales Engineer Important

His comments on external broaching predict that the application will depend entirely on costs and how well these operations adapt themselves to production. Where production requirements are large, undoubtedly broaching will find a field. However, there are many industries manufacturing a diversified line which does not give them an opportunity to take full advantage of such an operation. Further developments should be carried out to make this type of equipment applicable to low activities, Mr. Weaver suggests.

Demands upon the machine tool industry in the near future will be far in excess of anything experienced in the past, he believes. When we consider the changes that are taking place and the demands that will be placed on the manufacturers of various products throughout the country from both the labor and competitive standpoints, the old machine tool and manufacturing conditions will be entirely inadequate, he warns.

Repeating his past assertions, Mr. Weaver emphasizes the importance of the machine tool sales engineer. Customers, he says, will not be so much concerned about the construction of the machine but rather with what it will produce. It will be necessary, therefore, for the sales engineer to analyze the application thoroughly and devise new and better tooling set-ups so that products can be produced for less money in spite of the increase in wages, etc.

MANY automotive parts makers are working on profit margins so narrow that special machinery with resultant low unit labor costs, seems more attractive than ever, W. K. Creson, chief engineer, Ross Gear & Tool Co., Lafayete, Ind., declares. Flexibility of the standard machine tool is still, of course, desirable, he says, but the answer to the question "How does our competition do it?" which arises when prices are quoted, may partially at least be found in the reply, "Special equipment."

Alloy 548 still is the outstanding cutting tool for steel in the opinion of A. B. Bolender, tool supervisor Warner Gear Co., Muncie, Ind. He does not believe, however, that this is developed to a point where it is really ready for the market. An automatic broaching machine for broaching holes in cylinder blocks appeals to him as an outstanding development during 1934 and he believes it will open up new fields in future broaching practice.

SURVEYING the past year in the light of automotive requirements, D. A. Wallace, vice president in charge of manufacturing, Chrysler Sales Corp., Detroit, considers some outstanding developments. One of these is the turning of the contour of aluminum pistons to final form, and finishing by diamond turning machines that have been designed as single, double and continuous units. Working hand in hand with this innovation is diamond boring of piston pin holes. Although in operation several years, recent developments in these machines permit one operator to turn out a large volume of accurate work, Mr. Wallace explains.

Substitution of the single point boring tool for finishing of cylinder bores, thus replacing the reamer, is another accomplishment of the past year. Naturally, he asserts, all of this evolves around the rigidity of the machine, accuracy of workmanship and of design. Cylinder boring machines of this new type perform so accurately that only a small amount of lapping is necessary.

Tool men, according to Mr. Wallace, are deriving a great deal of satisfaction from the introduction of diamond dust grinding wheels and from a simple type of machine for grinding and lapping tungsten carbide and other super cutting alloy tools. The equipment referred to has a reversible motor so that the wheels will turn in either direction. One end is used for roughing alloy bits to form and the other is employed for finish lapping. The extreme accuracy and speed with which this grinding is accomplished is praiseworthy. There appears to be, according to Mr. Wallace, a trend more and more to drilling, boring, reaming and spot facing heads as a manufacturing medium. He is particularly impressed by the amount of operations that now are put on new and re-built machines with special types of heads. As have other contributors to this review, Mr Wallace calls attention to the extensive development of external broaching. This process, he declares, is rapidly taking the place of milling operations where there is a volume sufficient to afford the initial investment and the requirement for low production costs.

Automatic polishing and buffing machines also have scored highly in the automotive industry, Mr. Wallace asserts. These machines will finish chrome molding or other irregular parts regardless of shape, and polishes the sides, corners, radii, etc., automatically at high speed.

Continued activity in gear cutting and gear finishing machinery is significant, according to W. W. Finlay, manager, production engineering department, Wright Aeronautical Corp., Paterson, N. J. Demand for greater accuracy in gears as to tooth form, concentricity and spacing, and modifications of standard forms, has resulted in marked improvements in gear cutting machinery. These factors also have influenced rapid development of good gear grinding and lapping equipment, and while much still remains to be done in the field, indications are that definite progress is being made.

Progress in Grinding

Development of grinding machines and diamond impregnated grinding wheels for sharpening cemented carbide tools should give a decided impetus to the use of tungsten and tantalum carbide, he states. However, there appears to be room for machines capable of grinding milling cutters, reamers, and other multiple cutting edge tools tipped with cemented carbide.

Trend of machine design along the lines of the interchangeable unit is undoubtedly healthy and Mr. Finlay feels that it will go far in solving the economic problems that are the result of single purpose machinery. The tendency to design grinding machines with large diameter and long solid type bearings is interesting to him and he believes it should give a much longer accuracy life to machines so constructed. Also in grinding machines he notes the extension of automatic internal and external sizing devices.

STRIDES made recently in the application of nitralloy to all branches of the metalworking industry, particularly in cases where excessive wear has been experienced, is undoubtedly of extreme importance and will, Mr. Finlay feels, play a large part in years to come.

The lines of development of ma-

(*Please turn to Page* 279)

Light Weight, High Strength Still Refractory Trend

INSULATING firebrick of the semi-refractory type, considered by many furnace engineers to be the most significant development in the refractory field in many years, in the past year have changed their status from that of a new material to a product which is now on a firm basis, with its field becoming definitely outlined. In any review of refractories progress during 1934, this trend is clearly apparent.

Some new refractory materials have been introduced, such as forsterite and zircona. Deaired brick are now being made in vacuum power presses, with higher density and increased strength. Insulating materials of various new compositions, such as those with a mineral wool base, have been tested and in many cases have shown advantages. The main effort of refractory producers has been toward lighter weight, higher refractoriness, fuel savings and lower maintenance costs.

Of the light-weight refractories which can be used in certain installations to replace ordinary firebrick, the products made from fireclay, kaolin and silica have attracted the most attention, according to Fred A. Harvey, director of research, Harbison-Walker Refractories Co., Pittsburgh, who is of the opinion that this material may be considered standard for the construction of walls and crowns of certain types of furnaces operating at temperatures in general not exceeding 2500 degrees Fahr. This field includes various heating furnaces, annealing furnaces, glass lehrs, oil stills and the like. Light-weight refractories also are used for backing up where interface temperatures are too high for ordinary refractory insulation.

High Power Presses Used

Another development cited by Mr. Harvey is an improved "metalkase" brick which consists of a three-sided steel envelope which may be slipped over either chemically bonded or burned magnesite brick. The function of the metal is to strengthen the brick and to fill the joints between the brick with a material which by coalescing with the magnesite will form a monolithic wall. The usual "metalkase" brick have been made by ramming magnesite into steel cases which are either round or square. The improvement permits the manufacture of the brick in high-power presses so as to secure much greater density than was possible by the ramming method.

Mr. Harvey further notes that 1934 has witnessed the appearance of the mineral forsterite as a new refractory. It is the only magnesium silicate which has a stable existence above 1562 degrees Cent. Its melting point is 1910 degrees Cent. (3470 degrees Fahr.), and it is made by enriching pure magnesium olivines with MgO.

Exceptional among its properties is its ability to withstand heavy loads at high temperatures. While ordinary magnesite brick (certain low-iron brick excepted) will fail at moderately low temperatures under a loading of 25 pounds per square inch, the new forsterite refractory has been found to show negligible subsidence after 90 minutes at 2825 degrees Fahr. under this load. Low thermal conductivity also is important, forsterite brick transmitting only about one third as much heat at 2000 degrees Fahr. as does magnesite brick. This new material at present is still in the service trial stage and its ultimate field is as yet not definitely established.

Interest in Zircona Revived

William C. Buell Jr., engineer, Cleveland, states that lately zircona has been offered at the Atlantic seaboard in quantities and at a much lower price than heretofore and a group has been investigating the desirability of renewing experiments with refractories of this material, conducted several years ago and dropped largely because of the high price of the finished product.

A concern controlled by large glass manufacturing interests, which supplies the glass industry with refractories manufactured by melting silica-alumina materials in an electric furnace and pouring the fused mass in molds, has, during the past year, been investigating the open-hearth furnace as a possible market for brick to be made by fusing compounds such as lime and thus producing a highly basic refractory. At the present time the probable cost of such a product is rather dampening to even experimental installations, Mr. Buell notes.

The matter of insulating open-hearth furnaces as it pertains to refractories comes in for discussion by Kenneth C. McCutcheon, assistant general superintendent, Ashland division, American Rolling Mill Co., Ashland, Ky., who declares that reports seem to be general that some increase in tons per hour has resulted from insulation and, where properly used, increased furnace life with coincident reduced furnace repair cost, as well as considerable fuel saving, the latter averaging about 500,000 B.t.u. per gross ton of ingots tapped. This figure is for furnaces in which complete insulation has been made of checker chambers, uptakes and roof. The insulation of furnace hearths is going on gradually and reports on results obtained are coming in somewhat slowly because the applications are dependent on complete renewal of furnace bottoms and, therefore, generally only on new furnace construction.

INSULATION of soaking pit covers is being tried out with some success, says Mr. McCutcheon, and new heating surfaces and annealing furnaces will all show applications of complete insulation. Use of insulation has made it necessary to push vigorously the development of materials of high refractoriness and resistance to slag erosion, as the inside brick temperatures can be more readily put above the safe working temperature.

Some insulating materials contain mineral wool or slag wool, and Mr. McCutcheon reports that these have not proved satisfactory where the slag or mineral used for the manufacture of the wool has been of such a composition that it has fluxed under conditions where it was used.

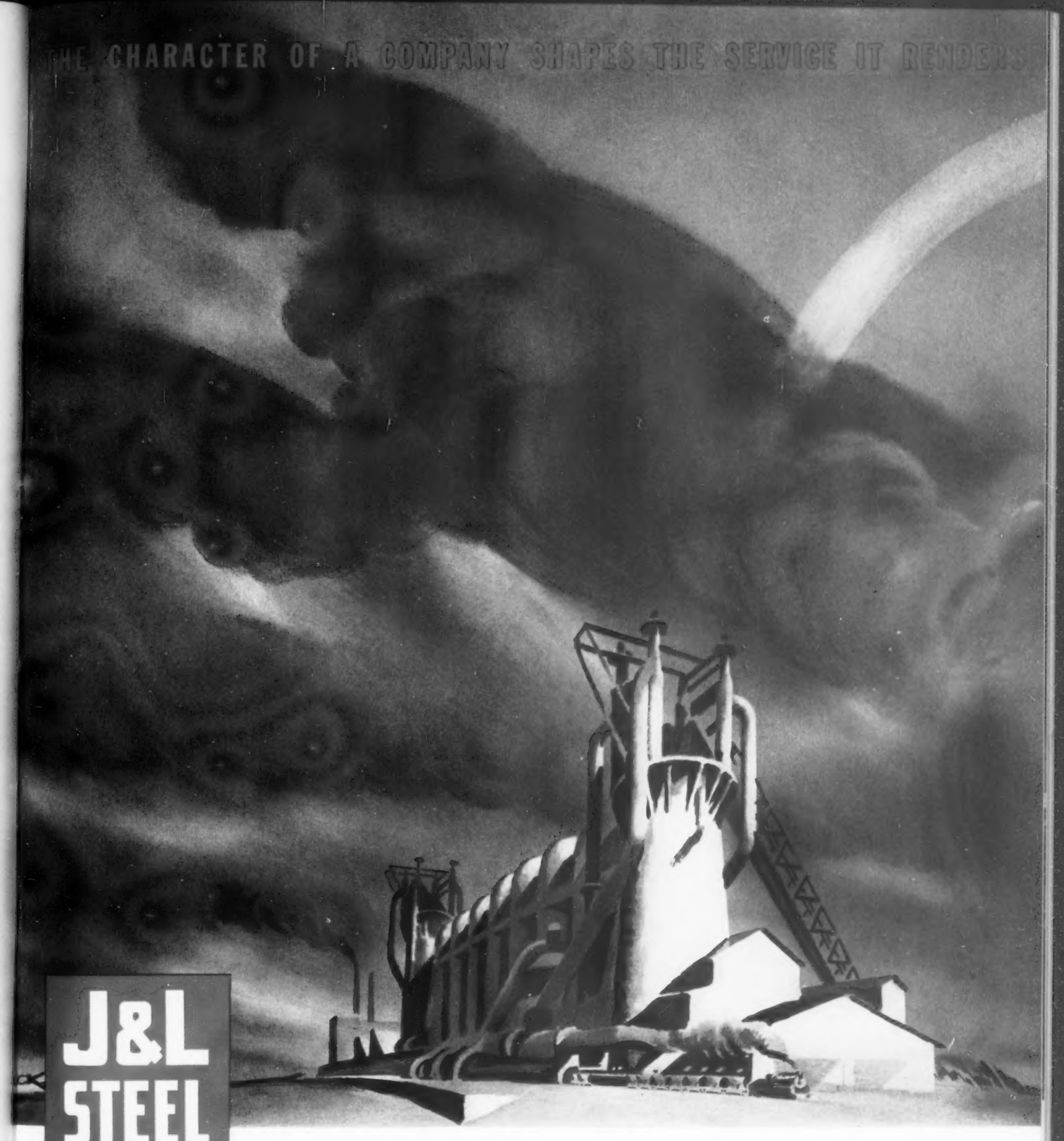
Steam Pressed Brick Improved

Steam pressed brick has been improved by a deaired processing which eliminates the core found in all shapes, but to a marked degree in large blocks. The result is a much denser brick, with increased resistance to slag penetration and enhanced resistance to disintegration. Mr. McCutcheon continues: "There has been a new brick put on the market recently which shows greater density even than the deaired brick, and is said to resist higher temperatures and show less spalling. This brick should find its place in the first pass of multiple-pass checkers and in the top courses where checker brick show fusing or fluxing from deposits of flue dust.

"In ladle brick, the development of materials to withstand the cutting action of low-carbon steels and their slag is indicated as necessary.

Light-weight insulating firebrick,

(*Please turn to Page 282*)



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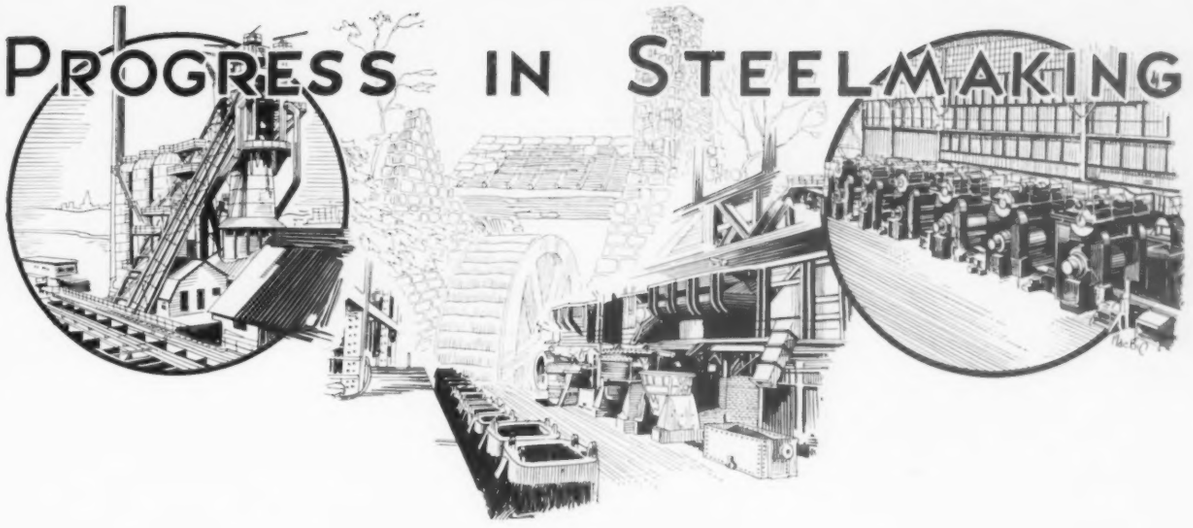

Large Expenditures Made For Wide Strip Mills

STEEL mill construction activities during the past year have been devoted almost entirely to facilities for the production of wide thin strip material. The well-sustained market demand for flat rolled stock, and recent developments in equipment and processes for more economical production and improved quality of product, have induced several steel companies to make large expenditures for new strip mill equipment.

In commenting on steel plant developments, A. F. Kenyon, industrial application engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., advises that the Youngstown Sheet & Tube Co., is completing at Campbell, O., the installation of a 79-inch wide continuous hot strip mill and also is installing cold strip finishing mills to be ready for operation early this year. The 12 main roll drive motors and three vertical edger motors driving the hot strip mill have a combined total rated capacity of 37,450 horsepower making this the most heavily powered hot strip mill yet built. The finishing stands are driven by six 3500-horsepower, 175/350 revolution per minute, 600-volt, adjustable-speed, direct-current motors, supplied from two 6000-kilowatt synchronous motor-generator sets.

Equipment for Cold Finishing

The cold finishing department will include a 3-stand tandem mill with tension reel, driven by three 1250-horsepower 300/600 revolution per minute, 600-volt, mill motors and a 225-horsepower, 225/900 revolution per minute reel motor; a single stand cold strip mill with tension reel, driven by a 1250-horsepower mill motor and 225-horsepower reel motor; a single stand sheet mill without reel, driven by a 1250-horsepower motor; and a skin pass strip mill with 250-horsepower mill motor and 125-horsepower reel motor. The single stand mills and drives may be converted to tandem mills later by installation of additional stands.

The Ford Motor Co., Dearborn, Mich., also is installing hot and cold strip mills, to produce flat rolled strip material used in the manufacture of automobiles, Mr. Kenyon points out. The finishing stands of the 56-inch continuous hot strip mill will be driven by four 3000-horsepower, 200/400 revolution per minute motors, geared to the first four stands and a 2500-horsepower, 150/330 revolution per minute motor, direct coupled to the last finishing stand. Power for the operation of these finishing stand motors and a smaller 400-horsepower scale breaker motor, will be supplied by six 1500-kilowatt synchronous motor-generator sets, already available.

Will Produce Wide Cold Strip

In the cold finishing department, an 84-inch wide single stand reversible mill will be driven by a 2000-horsepower 300/500 revolution per minute, 500-volt, mill motor, and two 800-horsepower 225/787 revolution per minute, 500-volt, reel motors. This 84-inch mill is designed for operation up to about 600 feet per minute strip delivery speed, and will be used to produce up to 78-inch wide strip in the usual sheet gages.

During the past year, states Mr.

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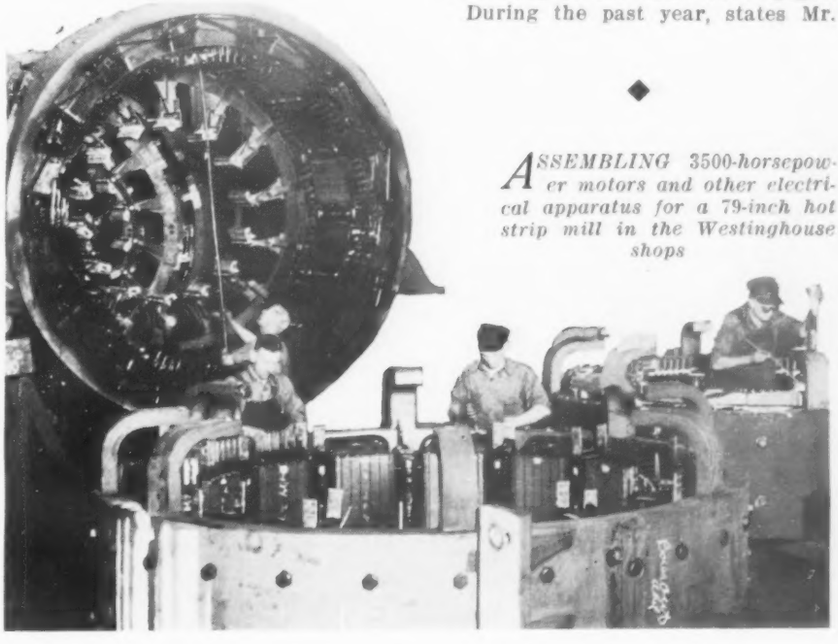


ASSEMBLING 3500-horsepower motors and other electrical apparatus for a 79-inch hot strip mill in the Westinghouse shops

Kenyon, there were placed in operation three 42-inch wide cold roll mills, designed for the rolling of light-gage strip for tinning. Of these tin plate mills one is of the single stand reversible type, powered by a 2000-horsepower reversible mill motor and two 600-horsepower reel motors; one is a 4-stand tandem mill with tension reel, powered by four 600-horsepower mill motors and a 150-horsepower reel motor; and one is a 5-stand tandem mill with reel, powered by five 800-horsepower mill motors and a 150-horsepower reel motor. Cold rolling for the production of thin material for tin plate has developed rapidly, and mills of both the tandem type and single stand reversible type are proving entirely successful for this class of cold rolling.

AS AN example of mill modernization Mr. Kenyon directs attention to the installation of a 4000-horsepower 370 revolutions per minute induction motor and reduction gear set to replace a steam engine for the drive of a continuous rod mill at the Johnstown plant of the Bethlehem Steel Co.

Alloy Dies Are Used

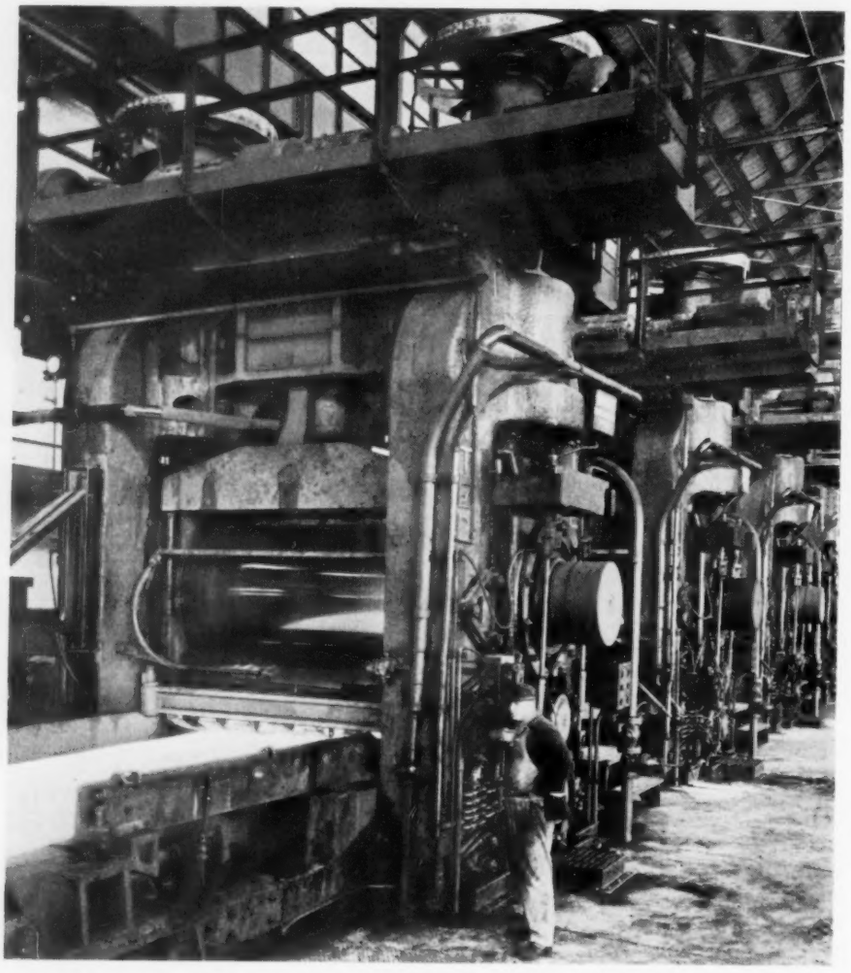
The majority of wire, rod and tube mills in 1934 made use of carbide dies for producing the bulk of their output, according to engineers of the Carboloy Co., Detroit. In the wire mills this includes round sizes from 0.009 to 1.000-inch and hexagonal sizes from 3/16 to ¾-inch. In the bar mills the use of shape dies has been enlarged to include shapes up to 1¼ inches and also to produce ovals, keystones, squares, etc. Tube mills, the report states, are using dies up to and including 2 inches, and orders have been placed for dies as large as 2½ inches.

Along with the application of carbide dies in tube mills has gone the application of tungsten carbide mandrels for finishing the inside diameter of the tubing. The use of these mandrels has been confined largely to the manufacture of alloy tubing but some mills, which have improved their lubricant, have been able to make general use of these mandrels.

In the bolt and nut industry, rapid progress has been made in the application of extruding dies and nut burnishing dies. Use of the carbide extruding die has improved the surface of the extruded portion of the bolt, so that the thread which is rolled on this portion is much more accurate as to pitch diameter and of a finer quality. Further, this type die has made it possible to hold close tolerances on pitch diameters. The burnishing die has allowed the manufacturer to offer to the trade a nut held to close limits, and with sharp corners, thus permitting the use of close fitting wrenches which eliminate the mutilation of the nut during the assembly operations.

Progress also has been made in the methods used in the mill for holding and servicing dies. It has been found that the use of spring bumpers or spring-mounted die boxes has reduced the impact load set up by quick starting blocks in the wire mills, and this feature, coupled with water or low-pressure air cooling, has increased the production per unit of die wear. Great strides also have been made by the use of carbide dies in the cleaning house where the wire, rod or tubing is prepared for the mill.

Mills have made careful studies of their die requirements which have allowed savings to be made by the selection of proper die sizes for producing their line of product. This study has shown that smaller dies will produce wire of larger diameters than formerly was thought possible. The result of this service work has been that the costs of the finished wire on the shipping platform have been decreased during 1934.



Finishing stands of a 96-inch 4-high mill for rolling plates continuously

IMPROVEMENT in business conditions brought about increased activity in steel mill construction in 1933, states H. A. Winne, industrial engineering department, General Electric Co., Schenectady, N. Y. This, he states, resulted in the purchase of a considerable amount of electrical apparatus and in some novel electrical developments.

The 44-inch reversing blooming mill of the Ford Motor Co., Dearborn, Mich., is to be driven by a direct-connected motor, rated 7000 horsepower continuous, 50/120 revolutions per minute, with a maximum capacity of 275 per cent of rated load. Power for the motor will be supplied by a motor-generator set consisting of two 3000-kilowatt, 750-volt generators driven by a 5000-horsepower, 13,200-volt, 3-phase, 60-cycle induction motor, and provided with a 50-ton flywheel having a stored energy of approximately 175,000 horse-

(*Please turn to Page* 285)

THIS IS A NIGHT VIEW OF THE FACTORY WHERE "CLEVELAND" TWIST DRILLS AND REAMERS HAVE BEEN MADE FOR 58 YEARS. OF COURSE, THE TRADE MARK - ◇C◇ - IS NOT ACTUALLY MOUNTED IN THE MIDDLE OF OUR FACTORY GROUP, NOR DO WE HAVE AN ARMY BOMBING PLANE "SEARCHLIGHT" IT NIGHTLY! BUT THE TRADE MARK IS STAMPED UPON EVERY PRODUCT WE MAKE TO SIGNIFY TO YOU, AND TO ALL OTHERS, THAT WE THINK WE MAKE BETTER THAN AVERAGE TOOLS. WE BELIEVE THAT WHEN YOU HAVE TRIED THEM AND DISCOVER WHAT THEY WILL DO TO HELP LOWER COSTS YOU WILL AGREE WITH US.

* * * * * *

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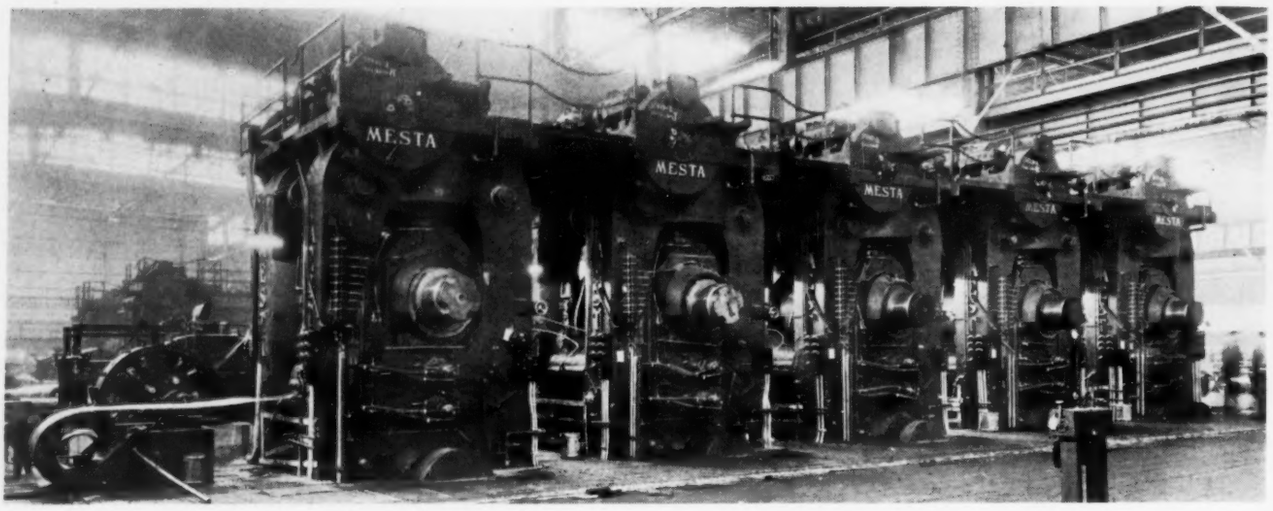


Five-stand 4-high cold mill for the continuous rolling of black plate in strip form

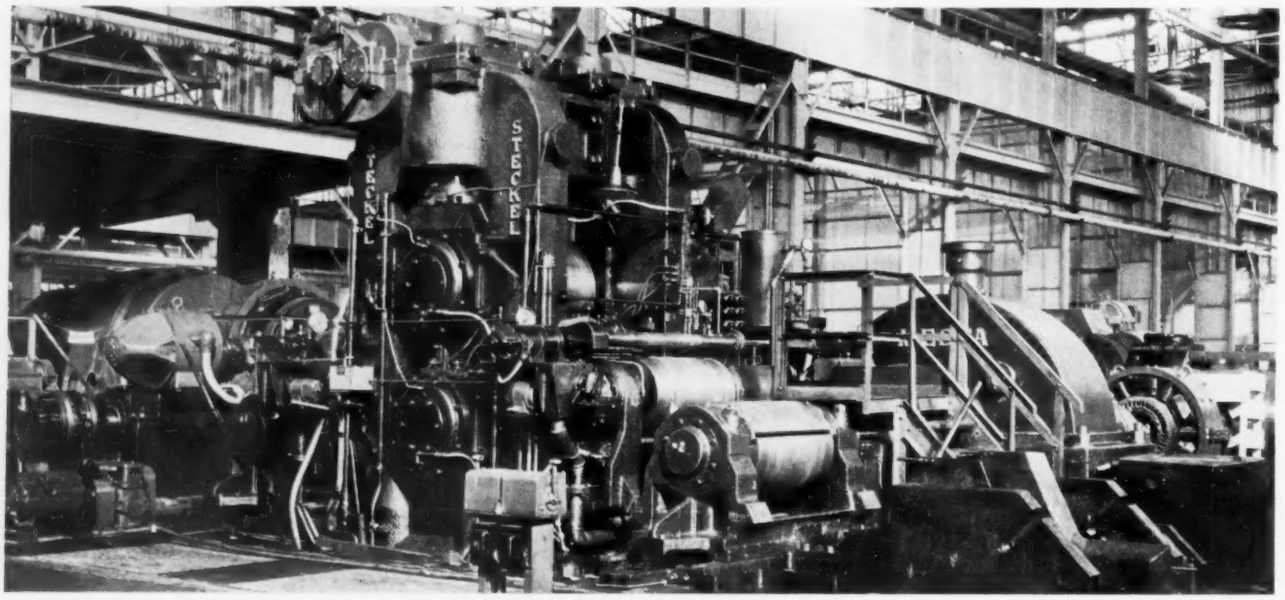
Steelworks' Executives Study All Factors of Operation

WHILE the tonnage of open-hearth steel improved last year compared to the 1933 production, no outstanding development occurred in furnace operation or construction. Changes in metallurgical operations are made cautiously and unless the method of making steel ingots is changed radically, this conservative tendency will become more pronounced because of the increasing size of the heats tapped and consequent greater hazards and cost of making experiments.

Concentrate on Rolling Problems

During 1934, states L. F. Reinartz, works manager, American Rolling Mill Co., Middletown, O., steel plant managements have concentrated most of their attention on rolling problems because revolutionary changes rapidly are being made in the art of rolling ingots into finished products. In the melting shop the main stress has been placed by the management on the most economical operation of the few units in service without spending much money.

Sealing and insulation of furnaces, Mr. Reinartz points out, have continued to pay dividends on money invested. Several new checker brick designs, which appear to have considerable merit, have been developed during the year. Nevertheless, most open-hearth operators believe the greatest economy may be secured by sealing and insulating furnace uptakes, slag pockets, and roof because the temperature of the preheated air in uninsulated furnaces usually shows a great drop after leaving the



Four-high reversing cold mill. The strip is pulled back and forth between the nondriven work rolls by motor-driven reels

It Produced . . . in 1934 . . . the Latest 3-High Rougher for Tata Iron and Steel Co., Ltd., India.

INDIA'S steel industry again uses Mackintosh-Hemphill *experience.* This 3-High Rougher joins the Blooming Mill and the Structural Mill (both Mackintosh-Hemphill manufacture) already performing for Tata Iron and Steel Co., Ltd., Jamshedpur.*

Tata's new Rougher will serve two finishing mills. Its installation in India has tremendous economic significance. Through the impressive reduction of investment per ton capacity, it makes old equipment far too expensive to use.

Into the manufacture of this mill went the *experience* gained through the construction of seventy-three previous sheet and tin mills; the *experience* gained in the construction of an average of a rolling mill a month for almost sixty years; the *experience* that has been accumulating since 1803.

Mackintosh-Hemphill *experience* is at your call —ready to aid you in the design and manufacture of machinery for any department of steel processing and finishing. We welcome inquiries.

*A M-H Tin Mill is also in use at plant of Burmah Oil Co. (Tinplate Company of India).

How Mackintosh-Hemphill Experience Can Be Put To Work For You

Mackintosh-Hemphill has available a new means of producing hot-rolled strip. It combines manufacturing *economy* with maximum *flexibility.* May we tell you about it?

MACKINTOSH HEMPHILL
PITTSBURGH

regenerator. Prof. W. Trinks, Carnegie Institute of Technology, Pittsburgh, has verified this opinion by showing the possible improvements that could be made in open-hearth furnace efficiency if this excessive drop in temperature in the uptake and slag pocket areas could be prevented. Higher preheat temperatures, as is obvious, will mean more tons per hour, less B. t. u. consumption of fuel per ton, and less furnace repair cost.

At a recent meeting of the Open-Hearth committee of the American Institute of Mining and Metallurgical Engineers, several open-hearth superintendents indicated that they had had partial failure of the furnace superstructure; the iron work tended to creep toward the tap hole side of the furnace because of the weight of the new sloping back walls and heavier roofs. W. C. Buell, Jr., Cleveland, stated that in order to meet the severe stresses set up by the modern sloping back wall, heavier roof, etc., it will be necessary to install rigid binding on the superstructure of the furnaces.

New basic refractory bricks have been developed which have decreased furnace repair cost considerably despite the high initial cost of these bricks. They have been used in front walls, ports and walls, tap holes and other places in the furnace where severe erosion and high temperature conditions must be met.

Proper Proportion Essential

Mr. Reinartz advises that experiments in the use of copper stools are continuing. Past performance indicates that they are no panacea for the ills of the steel pourer, but if the proper proportion between the ingot, mold, and stool weight is worked out, this type stool may, in time, help solve some of these problems. Those who desire to make experiments with copper stools should be sure that the weight of the stool in relation to the weight of the ingot is sufficient to withdraw the heat from the molten steel fast enough to prevent cutting or melting of the stool. He seriously questions whether copper inserts in cast iron or steel stools will be practical because of insufficient total conductivity in this type of stool. Tests have shown that pure copper, having high conductivity, is of paramount importance in the success of this type of stool. The addition of small quantities of molybdenum to cast iron ingot mold analysis is said to increase the life of the mold from a "fire cracking" standpoint.

AT THE October meeting of the Iron and Steel division, of the American Institute of Mining and Metallurgical Engineers in New York, great interest was manifested in a symposium on slag control in the open-hearth furnace. If any development deserves special attention at this time, Mr. Reinartz declares, it is the growing appreciation of the effect that the control of slag analysis, temperature, and its physical constitution may have on the quality of steel produced. Papers were read which discussed slag control from the standpoint of the manufacture of rimming, rail, alloy, forging and acid steels. Many factors remain to be solved. High temperature reactions always will be difficult to control accurately from heat to heat. The rule of reason must prevail in interpreting results of others. Nevertheless, more and more operators are finding that in the manufacture of steel it pays to standardize conditions of handling the furnace, mixture of scrap, charging, refining, tapping, and pouring practices. For this reason, slag control, as one of the steps, should be given careful consideration. By close attention to slag analysis for any given product, the quality of the product can be improved because of the uniformity of conditions and of results from heat to heat.

Process Is Questioned

C. F. Ramseyer will read a paper at the February meeting of the American Institute of Mining and Metallurgical Engineers in which he accuses open-hearth operators of lack of courage and foresight in failing to make use of the principles developed and made practical in other branches of the chemical and metallurgical industry. He would discard entirely the present method of manufacturing steel which he declares to be archaic and wasteful. He would substitute a complex set of reactions by the use of the blast furnace method of melting, counter flow plan of washing molten steel with oxidizing slag and later with basic slag, degasification under vacuum, removing nonmetallics by means of a centrifuge and then slab casting the product.

As a dream of the future, it is an interesting study and deserves careful consideration, Mr. Reinartz asserts. We must, however, walk before we can run. In his opinion, many obstacles, connected with the handling of large masses of molten metal and slag, must be overcome before such a scheme can become a reality. The variety of steels any open-

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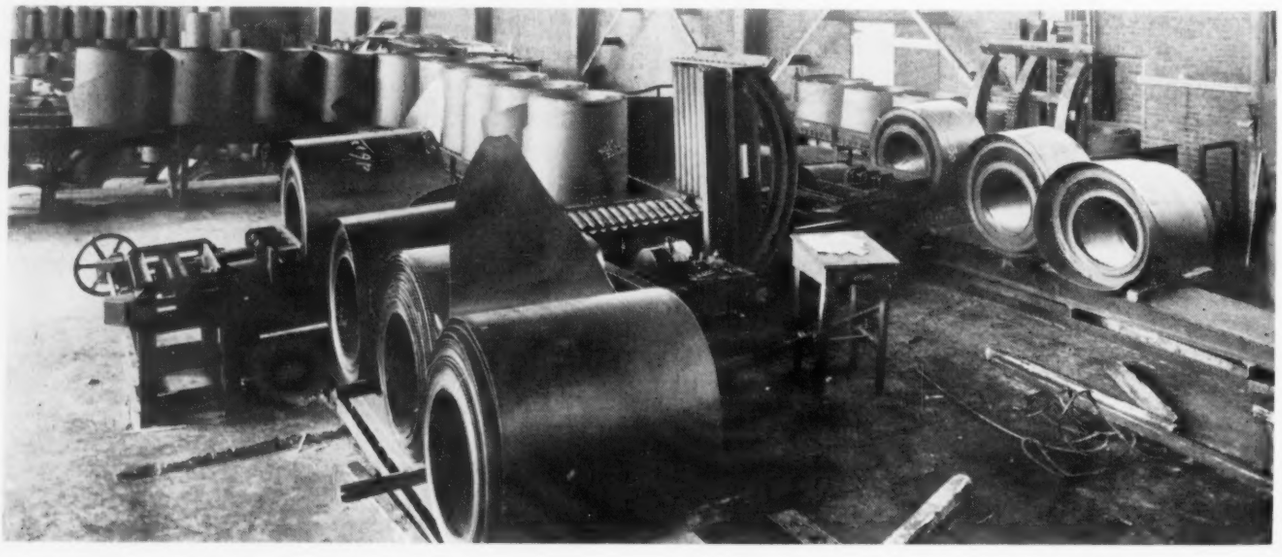

—Courtesy Mathews Conveyer Co.

Coil upenders and tilting station serving a continuous pickler of a modern wide strip mill

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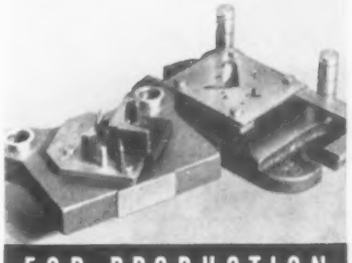

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Gas Distribution in Furnace Receives More Attention

BLAST furnace practice does not change much in such periods as the four years just ended, unless it is to polish up the technique of slow-blowing and of getting varying daily outputs from the same big furnace by simply changing the speed of the blowing engine. Such is the viewpoint of Ralph H. Sweetser, consultant in blast furnace practice, New York. Progress, he continues, seems to have been limited to refinements in a year when the peak of production was 50 per cent, and much of the time only 30 per cent.

Although research has not gone far enough to prove the advantages of large diameter hearths beyond a doubt, yet enough has been accomplished to show that the tendency of larger hearths is to cause more total carbon to enter the pig iron; an excess which has to be removed in subsequent processes in making steel. This increased total carbon in steelmaking irons, Mr. Sweetser states, is not a serious problem beyond extra time and expense in removing it, but it is contrary to what is desired in merchant pig irons, where lower carbons are necessary.

Obtain Richer Ore Burdens

Blast furnace men, he says, have given attention to excess moisture and silica in their iron ores and have been fairly successful in obtaining richer ore burdens. Less ash in the coke has helped much, but in his opinion, it should go still lower in some iron centers.

The next case of "excess baggage" in the iron industry to receive serious consideration is the 3½ tons, more or less, of air required to smelt each ton of pig iron. It is true that there are no freight charges on this huge tonnage of air, Mr. Sweetser contends, but it requires extensive equipment and a constant operating and maintenance expense to pump, convey, clean and dispose of it.

Many Theories Advanced

Making some record low operating costs by emergency practices during the past few years has led to an unusual amount of theorizing as to how these results can be maintained at higher rates of production, comments W. A. Haven, vice president, Arthur G. McKee & Co., Cleveland. Intensified interest has been shown in designs, equipment and operating practices that will reduce coke consumption and minimize losses to the same degree that has been accomplished by slow blowing.

The tendency in relining furnaces continues toward increasing the top diameter in order to reduce the velocity of gases. Mr. Haven further points out that more attention is being given to gas distribution within the furnace. In rebuilding one furnace, he states, the four offtakes were led into a single downcomer one of the objects being to equalize the travel of the gases and thereby encourage uniformity of gas velocities in the furnace top. This furnace is reported to be making not to exceed 75 pounds of flue dust per ton of iron at a normal rate of blowing. As a further indication of uniform furnace movement, it is stated that not a single tuyere has been burned during the past year's operation.

GAS distribution like stock distribution, Mr. Haven continues, is influenced by many conditions and at least one operator, during the year, has made an extensive study of the effect upon it on tuyere sizes and locations. Some new and interesting results were obtained which it is to be hoped soon will be made public. It seems probable that the emphasis recently placed upon the desirability of reducing gas volumes will lead to a reconsideration of the commercial possibilities in substituting gaseous or liquid fuels for coke and also increasing the oxygen content of the blast. Such schemes, Mr. Haven suggests, may be found to fit in with the government's large scale plans for the development of cheap electric power, one application for which could be the production of hydrogen and oxygen from water by electrolysis.

As an indication of the possibilities along this line, Mr. Haven mentions the recently built roasting furnace which utilizes fuel oil as a means of partially reducing low-

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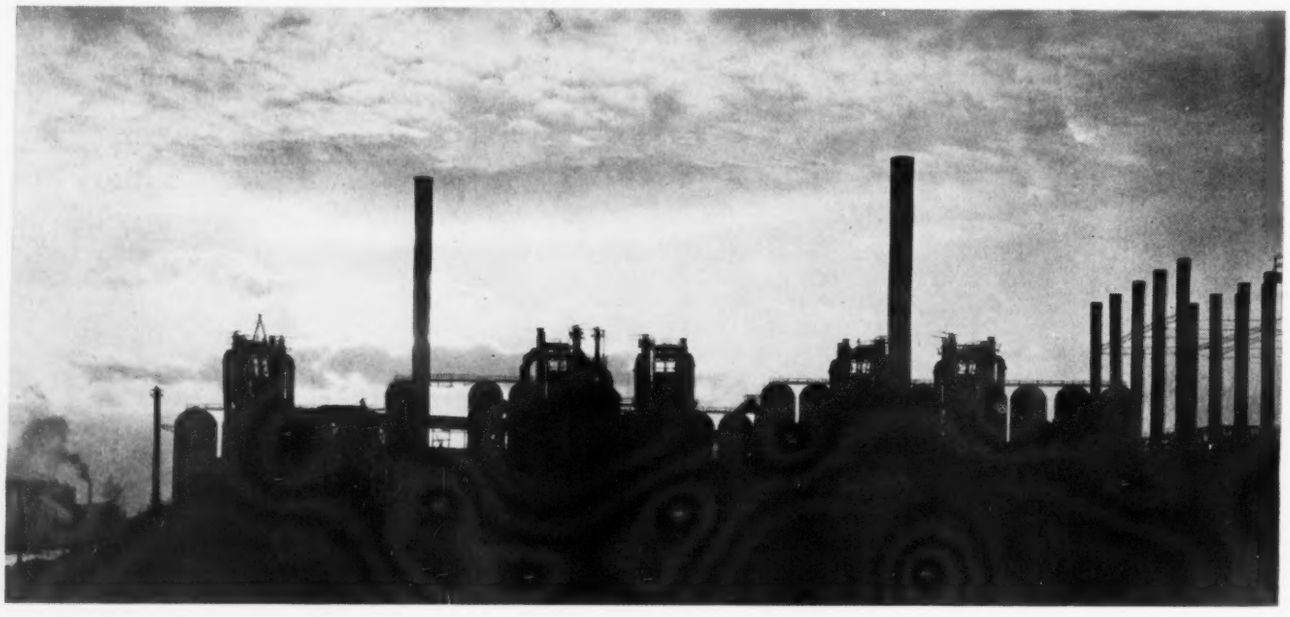
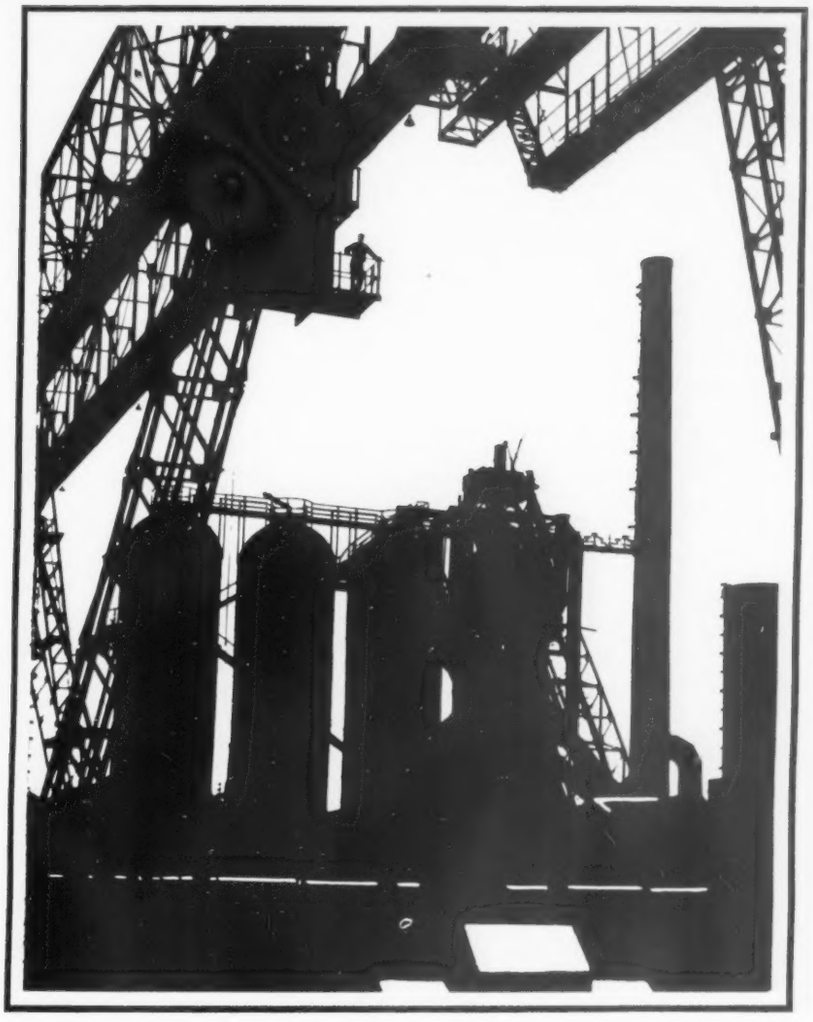


Blast furnaces at sunset. Photo courtesy Illinois Steel Co.



Heavier Production, Higher Prices Revive Confidence in Steel Industry

BY A. J. HAIN
Associate Editor, STEEL

BY A VERY narrow—but significant—margin, steel production in 1934 apparently exceeded that of 1931, establishing the year as the high mark since 1930.

With December estimated, ingots and castings totaled 25,953,000 gross tons, 7500 tons more than in 1931. Forty-five per cent as much steel was made last year as in 1929. The gain over 1933 was 11.7 per cent.

Production of coke pig iron—16,032,000 gross tons, with December estimated—was 20.4 per cent above 1933. The year, however, fell short of 1931 by 2,358,141 tons and the output was only 37 per cent of that in 1929.

Buoyed by automotive, railroad and building requirements, and stimulated by strike threats and price advances, demand stepped up briskly in the first half. By July the industry had made 121 per cent more pig iron and 80 per cent more steel than in the first six months in 1933. These

gains fell away quickly in the second half, though the year closed with a strong recovery setting in.

Removal of two artificial props to the market in July—labor and price uncertainties—caused the most abrupt descent in steelworks operations since the beginning of the depression. In mid-June the steelworks rate was 62 per cent, and in the first week of July only 22.

Despite this, however, the monthly average steelworks operating rates last year fluctuated less than in 1933, suggesting a tendency toward more stability in demand. The low month was September, at 22.7 per cent, and the high, May, at 65.4—a range of 33.6 points. In 1933 operations fluctuated through a range of 40.3 points. For the year, steelworks operations averaged 37 per cent, compared with 33.5 for 1933.

Industry's Position Better

THESE are the yardsticks by which the year will be measured, but more impressive, though intangible, to those concerned with the iron and steel markets, was the spread and strengthening of confidence.

A better understanding was reached between industry and government and labor; it was a better year financially for steel. Demand for industrial equipment rolled up as the year progressed. The steel industry itself is embarked on a $100,000,000 expansion program.

With this background, opinion in the industry appears to be unanimous that 1935 is to be better than 1934, though individual opinions are at variance as to whether the improvement will be more substantial than it was this year, or merely another step looking toward 1936 as a particularly good period.

Production of automobiles in 1934, approximately 2,800,000, was 1,000,000 more than in 1933, and the industry contemplates 3,000,000 or more in 1935. Washington's efforts to fill in valleys and level out peaks in automobile manufacture may result in a more even distribution of steel requirements throughout the year. Railroads will have to purchase a considerable tonnage of rails. Each year sees a larger accumulated demand for durable goods.

With few exceptions, iron and steel price trends in 1934 followed a simple pattern. In April, steel prices generally were advanced $1 to $8, after consumers were given the opportunity to cover for second quarter.

In June it was announced they were to be extended for third quarter, but July 2 they were reduced $1 to $4; at these levels they were renewed for fourth quarter, and again for the first quarter of 1935. Pig iron advanced $1 a ton during the year. STEEL's iron and steel price index at the start was $31.10, and $32.44 near the close, the year's average being approximately $32.15, against $29.30 in 1933, and $36.09 in 1929.

STEEL's finished steel price composite at the year's beginning was $51.10, and at the close $54. The average for 1934 was $53.42, compared with $47.09 for 1933 and $57.66 for 1929.

The firmer tone of the market was evidenced when the President in July issued an order permitting a 15 per cent reduction in code prices on government work, which failed to bring concessions on subsequent bidding.

On May 30 the code was amended to permit producers to meet any price reductions without a 10-day waiting period. Also, to provide that prices once named for a quarter cannot be raised during the quarter.

Steel strike threats in March and April, and announcement of higher prices for second quarter, developed a wave of buying for those months. Since then, however, there has been little incentive to contract for a quarterly period.

The fastest financial comeback in the history of the industry was recorded in the second quarter, when it showed a profit of $2.58 per ton of ingots produced, compared with a loss of $1.34 in the first three months. This gain, however, was wiped out in the third quarter, with a loss of $5.61 per ton. The experience of the fourth quarter was about that of the third.

In 1934 the iron and steel industry reported a deficit of $22,500,000; in 1933—$36,000,000; in 1932—$116,000,000; while the aggregate profit in 1929 was $371,000,000.

Wages and Employment Up

LABOR benefited immediately from improvement in the steel industry. In April wages were advanced 10 per cent. This with increases in 1933 practically restored the 1929 wage levels. In the first year of the steel code, ending Aug. 19, $95,000,000 was added to the industry's labor cost.

In the three months of top operations last year—April, May, June—the steelworks rate averaged 54 per cent of capacity, while employment was 98 per cent of the 1929 average.

Iron and steel exports snapped back vigorously, with 2,250,846 tons in the first ten months of the year, compared with 1,350,692 tons in all 1933. Scrap constituted 1,422,627 tons of these shipments. Imports for ten months were 261,781 tons, 92,502 tons less than in the first ten in 1933.

Railroads in 1934 purchased 424,746 tons of rails and about $8,000,000 worth of fastenings with government aid. Only 65 per cent of the rails were laid. In all, approximately 750,000 tons of rails were installed last year, compared with 797,790 tons, total for the preceding two years.

These have been insufficient to offset depreciations, and railroad authorities estimate 3,500,000 tons of rails will have to be laid to regain 1929 rail conditions.

Domestic freight car orders in 1934, with December estimated, were slightly under 24,000, compared with 2460 in 1933; 1739 in 1932; 10,694 in 1931 and 45,146 in 1930.

More Streamlined Trains

ATTEMPTS of railroads to recover passenger trade lost to automobiles, by means of high-speed trains and more comfortable equipment, took more definite form. Award of passenger cars, including 71 streamlined units, totaled more than 200, against a negligible number in 1933. More than 160 locomotives were purchased, compared with approximately 40 in 1933. Air-conditioning of cars was pushed; western roads have a winter program which may include air-conditioning 2500.

PWA up to Sept. 1 had loaned $86,069,500 for new freight and passenger cars and locomotives. On the other hand, producers extended the reduced price on rails—$36.37½—to orders booked before March 1 for delivery before June 30, 1935. A decision on the railroad's proposed freight advances is expected early this year, hearings having been held for the past several months.

Aside from railroad tonnage the government's hand appeared principally in public construction and navy work, aiding demand for plates, shapes and bars.

Plate buying was featured late in the year with 42,000 tons for naval vessels. At Pittsburgh recently barge building has tended to revive. Plate business generally, however, showed only slight improvement over 1933.

Structural fabricators took larger lots of plates, as did car builders. Plate prices began the year at 1.70c, base, Pittsburgh, and closed at 1.80c.

Government-sponsored work dominated the structural steel market. As compiled by STEEL, shape awards for 51 weeks were 841,800 tons, compared with 801,493 toss for all 1933. Fourteen Mississippi river locks took 50,000 tons, and 41,000 tons, including 35,000 tons of piling, were placed for the Bonneville, Oreg., dam, while the largest individual award of piling on record—21,000 tons—was made for the Grand Coulee, Wash., dam.

In April, structural shapes were advanced $3 a ton to 1.85c, base, Pittsburgh; in June were reduced $1 a ton to 1.80c, continuing at this level for the remainder of the year.

Piling was raised $3 a ton in April, the advance was withdrawn, and then reinstated in May.

Both new billet and rail steel reinforcing bars were advanced $3 a ton in May, to 2.05c, Pittsburgh, for straight lengths of new billet steel, and 1.90c, Pittsburgh, for rail steel. Adoption of a code and fairly good demand held these prices, the best in several years, through the remainder of 1934.

STEEL's compilations for 51 weeks in 1934 showed 212,213 tons of reinforcing steel awarded, compared with 196,101 tons in all 1933. The Bonneville dam took 12,000 tons; the Grand Coulee dam, 11,000 tons.

Implements Best in 3 Years

THE farm implement industry matched the improved operations of the automotive group and was a factor in stimulating carbon steel bar production. Farm equipment builders, including tractor manufacturers, had their best year of the past three. Road machinery sales also were the largest in several years. Various fluctuations left steel bar prices at the end of the year up $1 a ton.

Cold-finished carbon steel bars held firmly at 2.10c, base, Pittsburgh, throughout the year. Cold-drawn alloy bars were advanced $2 a ton in April, but this was rescinded in June.

Demand for oil country material featured the market for steel pipe, some producers reporting gains in shipments as high as 75 per cent over 1933. Among the relatively few line pipe orders were 11,000 tons for Great Lakes Pipe Line Co., Kansas City, Mo., and 4125 tons for American-Michigan Pipe Line Co. and Muskegon Gas Co. Steel pipe prices were advanced 3½ points, or $7 a ton, in April. Boiler tube prices were changed to a per-foot basis.

While the year originally gave promise of substantial improvment in cast iron pipe business, results were disappointing. PWA money was offered to many municipalities but a considerable proportion of proposed work was deferred or dropped. Class E pressure pipe advanced $2 in midyear.

Tin plate failed to measure up to its high production record of 1933 but, nevertheless, accounted for a heavy tonnage. Mill operations ranged from a protracted 85 per cent rate in the first half to a brief low of 30 per cent in November. Despite the drouth in midyear, can requirements were aided by many bumper crops, and the government's cattle canning program called for 175,000 tons of tin plate. Export business improved.

Heavy commitments for stock tin plate were made late in the year when producers announced this classification would be abolished Jan. 1. An increase of 10 cents in extras for primes, effective Jan. 1, also contributed. The base tin plate contract price of $5.25, Pittsburgh, applied through the year, and was extended for this year. Long ternes made a net advance of $3 a ton in the year.

Sheet production averaged a higher rate than other steel products, except tin plate, resulting mainly from improved requirements from automobile and a number of miscellaneous manufacturers.

Price advances in sheets in the second quarter, amounting to as much as $8 a ton, were reduced before they actually applied to new contracts, and quotations at the end of the year were $2 to $5 above levels 12 months previous.

Hot-rolled strip prices made a net advance of $2 a ton, and cold-rolled $4 a ton. Establishment of firmer extras on cold-rolled strip led many buyers to slit wide cold-rolled sheets. In the fall the commodity classification on cold-rolled strip was broadened to include widths down to 2 inches.

Activity in manufacturer's wire showed more improvement than in wire products. Demand from agricultural districts for fencing and barbed wire was adversely affected by the drouth.

After selling for a time in 1933 at a parity, plain wire and wire nails were priced last year at a differential of 15 to 20 cents. Nails were advanced during the year 50 cents a keg, while plain wire was up 20 cents for the 12 months.

Bolt and nut production for 1934, estimated at 275,000 tons, compared with 300,000 tons in 1933. Price competition in September was the severest in more than 10 years. A stronger tendency was noted, however, in December, with an advance of 10 per cent.

Raw Materials More Active

SEMIFINISHED steel prices made a net gain of $1 to $2. In April wire rods were increased $2 a ton to $38, Pittsburgh, and held at this level through the remainder of the year. Billets were raised $3 to $29, and sheet bars $4 to $30, thus establishing a $1 differential, but in July both these prices were reduced $2.

Scrap provided the market-year with some of its most spectacular features. Heavy exports drew material from as far inland as Pittsburgh.

Export buying overshadowed domestic demand in eastern states throughout the year, and the vessel movement from New York during the shipping season averaged 70,000 tons a month.

Domestic buying was concentrated in the first and fourth quarters. More than 500,000 tons was purchased by mills in April, and another but smaller buying wave developed in November, revealing a shortage of available scrap at Pittsburgh, and causing the unprecendented rise of $1.50 a ton in one week in December.

At Pittsburgh heavy melting steel scrap ranged from a low of $10 to $14.50. An extreme fluctuation of $4 a ton was noted at Chicago and other centers. STEEL's iron and steel composite began the year at $10.87, rose to a peak of $12.41 by the middle of March, dropped to the year's low $9.54 in October, and in the third week of December stood at $11.12.

Pig Iron Shipments Heavier

PIG iron shipments were the best since 1931. The gain over 1933, however, was moderate, due partly to the fact that closing of old contracts on Dec. 31, 1933, threw into that year shipments of considerable tonnage which would have been carried over into 1934.

Exchange rates benefited Pittsburgh rollmakers and brought considerable foreign business to this country, among which were the entire 1934 requirements of such mills as Tata Iron & Steel Co., India.

Connellsville furnace coke was reduced 25 cents a ton in March, but raised 35 cents a ton early in April, and an additional 20 cents a ton in May. A similar course was followed in both common and premium grades of foundry coke.

The movement of ferromanganese, while below normal, was a few points better than in 1933. Prices held throughout the year at $85, Atlantic and Gulf ports. Spiegeleisen was unchanged at $26, furnace, for 19-20 per cent. Prices were reaffirmed for shipment this year.

In the last half of the year refractory brick buying showed encouraging indications for improvement early this year. Many blast furnace relining projects cannot be delayed.

In volume, coke oven by-products were about even with 1933, although demand was steadier. Output was well below normal.

Greater steadiness was apparent in prices of nonferrous metals. Viewed broadly, demand did not reach the peak levels of 1933, but in aggregate increased substantially. Consumer buying toward the close of the year showed an encouraging and contraseasonal gain, as a reflection of an anticipated uptrend in business.

* * *

BK. PRICE and L. E. Browne, New York; W. G. Gude, Chicago; Edward A. France Jr., Pittsburgh; G. H. Manlove and I. H. Such, Cleveland, collaborated in this review of the 1934 market situation.

Domestic Average Monthly Prices in 1934

Base or furnace, unless otherwise specified; scrap, delivered to consumers

PITTSBURGH

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Structural Shapes	1.70c	1.70c	1.70c	1.80c	1.85c	1.85c	1.80c	1.80c	1.80c	1.80c	1.80c	1.80c
Plates	1.70	1.70	1.70	1.80	1.85	1.85	1.80	1.80	1.80	1.80	1.80	1.80
Bars	1.75	1.75	1.75	1.85	1.90	1.90	1.80	1.80	1.80	1.80	1.80	1.80
Cold-Finished Steel Bars	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
Strip, Hot-Rolled	1.75	1.75	1.75	1.90	2.00	2.00	1.85	1.85	1.85	1.85	1.85	1.85
Strip, Cold-Rolled	2.40	2.40	2.40	2.65	2.80	2.80	2.65	2.60	2.60	2.60	2.60	2.60
Standard Spikes	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Plain Wire	2.20	2.20	2.20	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
Structural Rivets	2.75	2.75	2.75	2.90	3.00	3.00	2.95	2.90	2.90	2.90	2.90	2.90
No. 24 Hot-Rolled Annealed Sheets	2.25	2.25	2.25	2.50	2.65	2.65	2.45	2.40	2.40	2.40	2.40	2.40
No. 9-10 Blue Annealed Sheets	1.75	1.75	1.75	1.90	2.00	2.00	1.85	1.85	1.85	1.85	1.85	1.85
No. 24 Galvanized Sheets	2.85	2.85	2.85	3.10	3.25	3.25	3.10	3.10	3.10	3.10	3.10	3.10
Tin Plate, base box	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25
Wire Nails	2.35	2.35	2.35	2.50	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Steel Pipe, 1 to 3-inch, % discount (base $200 per ton)	67.5	67.5	67.5	66.8	64	64	64	64	64	64	64	64
Bessemer Pig Iron, Neville Island base	$18.50	$18.50	$18.50	$18.80	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00	$19.00
Basic Pig Iron, Neville Island base	17.00	17.00	17.00	17.60	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
No. 2 Foundry Pig Iron, Neville Island base	18.00	18.00	18.00	18.30	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
Malleable Pig Iron, Neville Island base	17.50	17.50	17.50	18.10	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
Bessemer Ferrosilicon, 10 per cent (Jackson co. base)	27.25	27.25	27.25	27.25	27.75	27.75	27.75	27.75	27.75	27.75	27.75	27.75
Billets, Bessemer and Open-Hearth	$26.00	$26.00	$26.00	$27.80	$29.00	$29.00	$27.40	$27.00	$27.00	$27.00	$27.00	$27.00
Sheet Bars, Bessemer and Open-Hearth	26.00	26.00	26.00	28.40	30.00	30.00	28.40	28.00	28.00	28.00	28.00	28.00
Wire Rods	36.00	36.00	36.00	37.20	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Furnace Coke, spot	$3.60	$3.50	$3.35	$3.30	$3.45	$3.60	$3.60	$3.60	$3.60	$3.60	$3.60	$3.60
Foundry Coke, spot	4.25	4.25	4.25	4.55	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
Heavy Melting Steel Scrap	$13.05	$13.90	$14.30	$14.15	$12.80	$11.90	$12.00	$11.45	$10.75	$10.50	$11.15	$13.00
Low Phosphorus Scrap	16.00	16.25	16.90	16.90	15.55	14.45	14.50	14.00	13.50	13.40	13.75	15.00
No. 1 Cast Scrap	12.50	12.65	13.10	12.85	12.40	13.00	13.00	12.40	12.00	12.00	12.20	13.50

CHICAGO

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.c
Bars	1.80c	1.80c	1.80c	1.90c	1.95c	1.95c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85
Plates	1.75	1.75	1.75	1.85	1.90	1.90	1.85	1.85	1.85	1.85	1.85	1.85
Structural Shapes	1.75	1.75	1.75	1.85	1.90	1.90	1.85	1.85	1.85	1.85	1.85	1.85
Rail Steel Bars	1.70	1.70	1.70	1.79	1.85	1.85	1.77	1.75	1.75	1.75	1.75	1.75
Bar Iron*	1.60	1.60	1.60	1.60	1.75	1.80	1.77	1.75	1.75	1.75	1.75	1.75
No. 24 Hot-Rolled Annealed Sheets	2.38	2.38	2.38	2.63	2.78	2.78	2.58	2.53	2.53	2.53	2.53	2.53
*Terre Haute, Ind., base quoted; freight to Chicago 18 cents.												
No. 2 Foundry and Malleable Pig Iron	$17.50	$17.50	$17.50	$18.25	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50
Southern No. 2 Pig Iron, delivered	18.16	17.72	17.72	18.30	18.72	18.72	18.72	18.72	18.72	18.72	18.72	18.72
Lake Superior Charcoal Iron, delivered Chicago	23.54	23.54	23.54	23.66	24.04	24.04	24.04	24.04	24.04	24.04	24.04	24.04
Heavy Melting Steel Scrap	$10.44	$10.87	$12.00	$11.75	$11.13	$9.75	$9.55	$9.25	$8.65	$8.75	$9.00	$10.15
No. 1 Railroad Wrought Scrap	8.87	9.12	9.63	9.75	9.30	8.50	8.35	8.00	7.60	7.25	7.25	9.15
Rails for Rolling	11.25	12.00	12.75	12.75	12.37	11.25	10.95	10.50	10.10	9.85	10.25	11.40
Car Wheels, Iron	10.75	11.50	12.50	12.25	12.00	10.40	10.25	10.00	9.75	9.75	9.75	10.60
No. 1 Machinery Cast Scrap	8.90	9.00	9.05	9.05	9.00	8.50	8.50	8.50	8.15	8.40	8.75	9.55

EASTERN PENNSYLVANIA

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tank Plates, delivered Philadelphia	1.885c	1.885c	1.885c	1.985c	2.035c	2.035c	1.985c	1.985c	1.985c	1.985c	1.985c	1.985c
Structural Shapes, delivered Philadelphia	1.905	1.905	1.905	2.005	2.055	2.055	2.005	2.005	2.005	2.005	2.005	2.005
Bars, delivered Philadelphia	2.04	2.04	2.04	2.14	2.19	2.19	2.09	2.09	2.09	2.09	2.09	2.09
Bar Iron, common, delivered Philadelphia	1.74	1.74	1.74	1.79	1.99	1.99	1.91	1.89	1.89	1.89	1.89	1.89
No. 10 Blue Annealed Sheets, delivered Philadelphia	2.04	2.04	2.04	2.19	2.29	2.29	2.14	2.14	2.14	2.14	2.14	2.14
Basic Pig Iron, delivered	$18.76	$18.76	$18.76	$19.51	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76
No. 2X Foundry Pig Iron, delivered Philadelphia	19.63	19.63	19.63	20.38	20.63	20.63	20.63	20.63	20.63	20.63	20.63	20.63
Standard Low Phosphorus Pig Iron	24.13	24.13	24.13	24.13	24.63	24.63	24.63	24.63	24.63	24.63	24.63	24.63
No. 1 Heavy Melting Steel Scrap	$11.63	$11.73	$11.70	$11.50	$11.00	$10.40	$10.25	$9.85	$9.60	$9.50	$9.95	$10.85
No. 1 Railroad Wrought Scrap	12.75	12.75	12.75	12.25	11.55	10.00	10.20	9.80	9.50	10.25	10.70	11.65
No. 1 Cupola Cast Scrap	11.50	11.65	12.30	12.50	12.15	12.00	11.25	11.00	11.00	11.00	11.00	11.25

COAL TAR PRODUCTS

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Benzol, per gallon producers' plants, tank lots	21.40c	20.50c	20.50c	19.30c	19.00c	19.00c	19.00c	19.00c	19.00c	19.00c	19.00c	19.00c
Toluol, per gallon producers' plants, tank lots	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Solvent naphtha, per gallon producers' plants, tank lots	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
Phenol, per pound, producers' plants in 200 lb. drums	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30
Naphthalene flakes, per pound producers' plants	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.50
‡Naphthalene balls, per pound producers' plants	7.25	7.25	*6.874	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.50
Sulphate of Ammonia, per 100 lbs., Atlantic seaboard	$1.25	$1.25	$1.25	$1.25	$1.25	$1.25	$1.25	$1.225	$1.20	$1.20	$1.20	$1.20

*Flakes and balls on same price basis starting week of March 19.
‡Western prices one-half cent higher.

NONFERROUS METALS

Prompt, wholesale prices in cents per pound

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tin, Straits, spot, New York	51.875	51.632	53.856	55.633	53.513	51.274	51.925	51.964	51.470	50.941	51.208	50.950
Copper, electro, delivered Connecticut	8.192	8.000	8.000	8.402	8.500	8.827	9.000	9.000	9.000	9.000	9.000	9.000
Zinc, prime western, East St. Louis	4.270	4.386	4.369	4.371	4.354	4.241	4.317	4.282	4.057	3.841	3.729	3.722
Lead, open market, East St. Louis	3.900	3.900	3.900	4.046	3.990	3.825	3.632	3.603	3.538	3.512	3.417	3.450
Lead, open market, New York	4.000	4.000	4.000	4.184	4.140	3.975	3.777	3.748	3.688	3.663	3.567	3.600
Aluminum	21.400	21.073	20.950	20.950	20.950	20.950	20.950	20.950	20.950	20.000	20.000	20.000
Antimony, spot, New York	7.223	7.177	7.558	7.919	8.492	7.924	8.055	8.539	8.774	9.428	12.367	13.878
Nickel, cathodes	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000	35.000

Prices Tell Market History

Ores and Alloys

Per Gross Ton

Iron Ore Prices at Date of Buying Movement, del. lower lake ports

Season	Date buying movement	Old range Bessemer Ton	Old range Bessemer Cents per unit	Old range Nonbessemer Ton	Old range Nonbessemer Cents per unit	Mesabi Bessemer Ton	Mesabi Bessemer Cents per unit	Mesabi Nonbessemer Ton	Mesabi Nonbessemer Cents per unit	Iron prices, Valley Bessemer	Iron prices, Valley No. 2 Foundry
1934	May 19, 1934	$4.80	9.320	$4.65	9.029	$4.65	9.029	$4.50	8.738	$19.00	$18.50
1933	June 12, 1933	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	16.00	15.50
1932	June 3, 1932	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	14.50	14.50
1931	April 15, 1931	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	17.00	17.00
1930	April 1, 1930	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	19.00	18.50
1929	March 22, 1929	4.80	9.320	4.65	9.029	4.65	9.029	4.50	8.738	18.50	18.00
1928	April 16, 1928	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	17.50	17.25
1927	April 8, 1927	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	19.50	18.50
1926	March 17, 1926	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	21.00	20.50
1925	April 4, 1925	4.55	8.835	4.40	8.544	4.40	8.544	4.25	8.252	22.00	21.00
1924	March 24, 1924	5.65	11.364	4.90	10.680	5.40	10.909	4.75	10.388	23.00	22.00
1923	March 24, 1923	6.45	12.818	5.70	12.233	6.20	12.364	5.55	11.942	31.00	31.00
1922	June 9, 1922	5.95	11.909	5.20	11.262	5.70	11.454	5.05	10.971	25.00	24.00
1921	June 16, 1921	6.45	12.818	5.70	12.233	6.20	12.364	5.55	11.942	23.00	22.50
1920	Feb. 2, 1920	7.45	14.636	6.70	14.175	7.20	14.182	6.55	13.883	41.00	40.00
1919	April 28, 1919	6.45	12.818	5.70	12.233	6.20	12.364	5.55	11.942	27.95	26.75
1918—Govt. Prices	Oct. 1, 1918	6.65	13.182	5.90	12.621	6.40	12.727	5.75	12.330	35.20	34.00
	July 1, 1918	6.40	12.727	5.65	12.136	6.15	12.273	5.50	11.845	35.20	33.00
	April 1, 1918	5.95	11.909	5.20	11.262	5.70	11.454	5.05	10.971	35.20	33.00
1917	Nov. 22, 1916	5.95	11.909	5.20	11.262	5.70	11.454	5.05	10.971	30.00	26.00
1916	Dec. 7, 1915	4.45	9.181	3.70	8.349	4.20	8.727	3.55	8.058	18.50	18.00
1915	April 19, 1915	3.75	7.909	3.00	6.990	3.45	7.455	2.80	6.699	13.60	12.75
1914	May 1, 1914	3.75	7.909	3.00	6.990	3.50	7.445	2.85	6.699	14.00	13.25
1913	Nov. 19, 1912	4.40	9.091	3.60	8.155	4.15	8.636	3.40	7.767	17.25	17.50
1912	March 20, 1912	3.75	7.909	3.00	6.990	3.50	7.455	2.85	6.690	14.25	13.25
1911	April 21, 1911	4.50	9.273	3.70	8.349	4.25	8.818	3.50	7.961	15.00	13.75
1910	Dec. 24, 1909	5.00	10.182	4.20	9.320	4.75	9.727	4.00	8.932	19.00	17.25

Manganese Ore

Dollars Per Gross Ton, Duty Paid, Northern Atlantic Ports, on Basis of 50 Per Cent Ore

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$21.70	$22.70	$22.70	$22.70	$22.70	$22.70	$22.70	$22.70	$23.20	$23.70	$23.70	$23.70
1933	19.95	19.95	19.95	19.95	19.95	20.20	20.45	21.45	21.45	21.70	21.70	21.70
1932	22.70	22.70	22.70	22.70	21.70	21.70	21.70	21.70	21.20	21.20	21.20	20.70
1931	24.20	24.20	23.70	23.70	23.70	23.70	23.70	23.70	23.70	22.70	22.70	22.70
1930	29.95	24.70	24.70	24.70	24.70	24.70	24.70	24.20	24.20	24.20	24.20	24.20
1929	27.70	27.70	27.70	27.70	27.70	27.70	26.70	26.70	26.70	25.70	25.70	25.70
1928	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	30.20	29.20	29.20
1927	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70
1926	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.70
1925	32.20	32.70	33.20	33.20	32.70	32.20	32.20	32.20	31.70	31.70	31.70	31.70
1924	31.20	32.70	32.20	32.20	32.20	31.70	30.70	30.20	30.20	30.20	31.70	32.20
1923	29.45	29.45	31.70	33.20	32.70	32.95	32.95	32.95	31.70	31.70	31.70	31.70
1922	10.50	11.00	12.50	12.75	12.75	13.25	13.50	13.75	*14.35	25.50	25.50	25.50
1921	18.75	17.50	17.25	14.00	14.00	12.50	12.50	12.50	12.50	12.50	12.50	12.00
1920	30.00	38.75	38.75	32.25	35.00	37.50	42.25	35.00	35.00	32.75	25.00	21.25
1919	55.50	38.75	37.50	30.00	30.00	30.00	31.25	31.25	30.00	27.50	27.50	27.50
1918	63.75	63.75	60.00	65.00	65.00	65.00	68.50	65.00	65.00	65.00	62.50	55.00
1917	30.00	30.00	40.00	40.00	50.00	50.00	50.00	50.00	60.00	60.00	60.00	60.00
1916	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	30.00	30.00	30.00	30.00
1915	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	22.50	22.50	22.50	22.50

*After September, 1922, duty 1c per pound metallic content, $11.20 per gross ton 50 per cent ore.

Bessemer Ferrosilicon, 10 Per Cent

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$27.25	$27.25	$27.25	$27.25	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75	$27.75
1933	20.50	20.50	20.50	20.50	20.50	20.75	22.40	24.65	27.00	27.75	27.75	27.75
1932	23.00	22.00	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50
1931	25.00	25.00	25.00	25.00	25.00	25.00	25.00	24.00	23.00	23.00	23.00	23.00
1930	30.00	30.00	30.00	30.00	30.00	29.50	29.00	29.00	25.00	25.00	25.00	25.00
1929	31.00	31.00	31.00	31.00	31.00	31.00	31.00	30.20	30.00	30.00	30.00	30.00
1928	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
1927	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	33.50	32.00	30.00
1926	35.00	35.50	36.00	34.40	33.00	33.00	33.00	33.00	33.00	33.25	34.00	34.00
1925	39.50	39.50	39.50	37.50	35.50	35.00	35.50	35.50	34.00	33.50	34.25	35.00
1924	41.50	42.50	42.25	41.50	40.30	39.50	39.50	39.50	39.50	39.50	39.50	39.50
1923	44.50	45.50	47.10	48.50	48.50	48.00	46.50	43.50	43.50	43.50	41.50	41.50
1922	38.50	37.50	36.50	37.25	40.50	41.50	41.50	42.50	48.50	50.00	48.00	44.50
1921	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	52.50	57.50
1920	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50	82.50
1919	54.00	54.00	52.95	47.40	45.00	47.40	49.75	49.75	49.75	49.75	54.75	58.50
1918	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	57.00	57.00	57.00
1917	42.00	42.00	49.80	57.00	67.00	82.50	92.25	95.00	95.00	95.00	55.00	55.00
1916	28.00	28.00	31.00	31.00	32.00	32.00	32.00	31.80	30.25	30.50	34.60	42.00

Ferrosilicon, 50 Per Cent

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$77.50	$77.50	$77.50	$77.50	$77.50	$77.50	$77.50	$77.50	$77.50	$77.50	$77.50	$77.50
1933	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50	74.50
1932	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	77.50	76.30
1931	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	77.50
1930	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1929	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1928	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50	83.50
1927	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1926	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1925	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
1924	75.00	75.00	75.00	75.00	75.00	75.00	74.50	74.50	74.50	75.00	75.00	82.50
1923	85.00	90.00	92.50	95.00	95.00	87.50	82.50	82.50	82.50	82.50	80.00	75.00
1922	57.50	55.00	54.00	55.00	57.50	57.50	55.00	55.00	55.00	70.00	82.50	82.50
1921	80.00	92.00	93.00	90.00	80.00	75.00	75.00	65.00	65.00	65.00	60.00	75.00
1920	82.00	80.00	83.00	80.00	83.00	82.50	82.50	80.00	82.50	82.50	80.00	80.00
1919	145.00	125.00	115.00	110.00	110.00	85.00	80.00	78.00	80.00	85.00	80.00	80.00
1918	175.00	175.00	177.50	172.50	170.00	170.00	165.00	153.50	150.00	151.00	150.00	150.00
1917	122.50	156.25	175.00	187.50	230.00	230.00	237.50	225.00	212.50	171.25	157.50	172.50
1916	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	94.25	95.00	95.00

Spiegeleisen

At Producers' Furnaces

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00	$26.00
1933	24.00	24.00	24.00	24.00	24.00	24.00	27.00	27.00	27.00	27.00	27.00	27.00
1932	27.00	27.00	27.00	27.00	27.00	26.50	25.00	25.00	25.00	25.00	24.25	24.00
1931	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	27.00
1930	34.00	34.00	34.00	34.00	34.00	34.00	33.00	33.00	33.00	33.00	33.00	30.00
1929	34.00	34.00	34.00	34.00	34.00	34.00	34.00	33.20	33.50	34.00	34.00	34.00
1928	32.00	32.00	32.00	32.00	32.00	32.00	33.00	33.00	33.00	33.00	33.00	34.00
1927	37.00	37.00	37.00	37.00	35.50	34.80	34.00	33.35	33.00	30.15	30.00	31.00
1926	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	38.75	37.00
1925	32.00	33.00	33.00	33.00	33.00	32.00	31.50	32.25	33.00	33.00	34.00	34.00
1924	39.00	39.00	38.00	38.00	36.75	36.00	35.00	32.50	32.00	31.00	31.75	31.00
1923	34.90	35.75	37.25	39.25	43.00	46.00	45.00	45.00	43.50	40.00	39.00	38.00
1922	25.50	28.00	28.00	30.00	35.00	35.25	35.00	37.00	38.00	37.75	36.80	35.50
1921	46.25	37.75	34.20	32.00	31.75	29.60	27.50	26.20	25.25	24.85	25.00	25.00
1920	46.60	57.60	60.40	66.85	75.00	75.00	75.00	79.35	82.00	80.00	74.35	57.90
1919	*67.50	*52.50	*42.50	*34.50	*31.35	*27.50	34.00	34.00	34.00	34.00	34.00	39.00
1918	59.00	59.00	65.50	*70.00	*71.00	*75.00	*75.00	*75.00	*75.00	*75.00	*75.00	*72.50
1917	57.50	66.25	77.50	76.75	78.00	83.00	85.00	81.25	80.50	73.50	63.25	60.00
1916	32.50	42.50	55.00	60.00	60.00	55.00	47.50	47.50	45.00	40.00	45.00	50.00
1915	25.00	25.50	26.00	26.00	26.00	26.00	26.00	26.00	29.00	30.00	30.00	30.00

*Prices from and including April, 1918, and to and including June, 1919, are for 16 per cent spiegeleisen. All other prices apply to 20 per cent metal.

Ferromanganese, delivered Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$90.24	$90.24	$90.24	$90 24	$90.24	$90.00	$89.79	$89.79	$89.79	$89.79	$89.79	$89.79
1933	73.24	73.24	73.24	73.24	73.24	73.24	84.44	87.24	87.24	87.24	87.24	87.24
1932	79.85	80 24	20.24	80.24	80.24	74.99	73.24	73.24	73.24	73.24	73.24	73.24
1931	89.79	89.79	89.79	89.79	89.79	89.79	89.79	89.79	89.79	89.79	89.79	79.79
1930	104.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	103.79	93.25
1929	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	109.79	104.79
1928	104.79	104.79	104.79	104.79	108.19	109.79	109.79	109.79	109.79	109.79	109.79	109.79
1927	104.79	104.79	104.79	104.79	98.54	94.79	94.79	94.79	94.79	94.79	94.79	103.42
1926	119.79	119.79	102.29	92.79	92.79	92.79	92.79	92.79	92.79	99.79	104.79	104.79
1925	116.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79	119.79
1924	113.79	112.29	112.29	112.29	112.29	112.79	110.79	98.79	97.79	104.79	107.29	109.79
1923	109.79	112.29	120.79	124.79	129.79	129.79	122.29	122.29	114.79	112.79	113.79	113.79
1922	61.90	65.32	67.82	69.07	72.32	72.82	72.29	72.29	† 80.59	105.47	104.92	104.92
1921	101 00	96.85	89.00	87.50	83.00	76.50	75.00	70.75	64.75	61.65	60.00	60.00
1920	146.00	160.00	172.00	200.00	200.00	198.00	190.00	193.75	172.40	156.40	153.00	120.00
1919	*212 50	165.00	134.00	113.75	110.00	111.75	111.00	110.00	105.00	110.00	110.00	121.00
1918	250.00	250.00	250.00	250.00	*250.00	250.00	*250.00	*250.00	*250.00	*250.00	*250.00	*236.00
1917	175.00	192.50	212.50	250.00	375.00	400.00	400.00	387.50	380.00	300.00	247.50	242.50
1916**	139.88	215.13	334.75	412.50	347.75	244.88	198.75	173.18	167.67	160.00	155.00	162.50
1915	68.00	78.80	95.00	95.00	97.00	105.00	103.57	101.36	110.00	109.64	100.42	103.04
1914	43.57	39.01	39.02	38.68	38.16	38.00	37.54	102.08	93.45	70.80	67.85	68.00

*Prices from May, 1918, to January, 1919, inclusive, were based on 70 per cent ferromanganese. All other prices in above table were based on 80 per cent metal.

†Duty of 1⅞ cents per pound contained manganese became effective on ferromanganese Sept. 21, 1922.

**Quotations seaboard to January, 1917; delivered Pittsburgh thereafter.

Ferrotungsten

Per Pound of Metallic Tungsten Contained

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$1.16	$1.16	$1.16	$1.20	$1.35	$1.45	$1.35	$1.35	$1.35	$1.35	$1.35	$1.35
1933	0.94	0.94	0.94	0.94	0.94	0.94	0.96	1.04	1.02	1.10	1.16	1.16
1932	1.10	1.10	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
1931	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
1930	1.45	1.45	1.43	1.40	1.35	1.20	1.20	1.10	1.11	1.11	1.12	1.13
1929	1.04	1.04	1.09	1.30	1.32	1.36	1.38	1.43	1.45	1.45	1.45	1.47
1928	0.94	0.93	0.93	0.93	0.95	0.96	0.97	0.97	0.97	0.97	0.98	1.00
1927	1.05	1.05	1.01	1.00	0.93	0.98	0.96	0.94	0.92	0.92	0.92	0.95
1926	1.14	1.14	1.14	1.09	1.08	1.00	1.00	1.00	1.00	1.00	1.05	1.05
1925	0.86	0.88	0.93	1.02	1.00	1.01	1.07	1.07	1.10	1.11	1.12	1.15
1924	0.87	0.86	0.88	0.90	0.91	0.90	0.89	0.87	0.87	0.87	0.87	0.87
1923	0.87	0.87	0.89	0.90	0.92	0.92	0.95	0.88	0.87	0.87	0.87	0.87
1922	0.42	0.37	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.85	0.92	0.92
1921	0.65	0.57	0.57	0.47	0.47	0.50	0.50	0.47	0.36	0.36	0.36	0.36
1920	1.05	1.05	1.00	1.00	1.05	1.07	1.12	1.10	1.10	0.95	0.95	0.95
1919	2.35	2.15	2.07	1.75	1.40	1.32	1.30	1.22	1.25	1.25	1.20	1.15
1918	1.95	2.72	1.98	2.32	2.26	2.23	2.25	2.32	2.32	2.55	2.65	2.45

Ferrochrome, 4-6 Per Cent

Per Pound of Metallic Chromium Contained

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	10.00c	10.00c	10.00c	10.00c	10.00c	10.00c	10.00c	10.00c	10.00c	10.00c	10.00c	10.00c
1933	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.60
1932	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	9.90
1931	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	10.25
1930	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1929	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1928	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1927	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50
1926	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11 50	11.50
1925	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50
1924	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75
1923	12.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
1922	14.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	13.00	13.50	13.50
1921	17.50	17.25	17.25	16.25	16.00	15.00	15.00	14.00	14.50	14.50	14.50	14.50
1920	22.50	19.50	19.50	19.50	18.50	18.50	21.50	20.00	18.50	18.50	18.50	18.50
1919	41.00	32.50	31.00	31.00	32.00	32.00	32.00	32.00	29.00	29.00	28.00	28.00
1918	.....	.....	.....	.....	.....	.....	44.00	41.00	41.00	41.00	41.00	41.00

Pig Iron

Per Gross Ton

Basic, Valley

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$17.00	$17.00	$17.00	$17.60	$18.00	$18.00	$18.00	$18.00	$18.00	$18.00	$18.00	$18.00
1933	14.00	14.00	14.00	14.00	14.40	15.00	15.60	16.00	17.00	17.00	17.00	17.00
1932	15.00	15.00	15.00	15.00	15.00	14.50	14.00	14.00	14.00	14.00	14.00	14.00
1931	17.00	16.75	16.75	17.00	17.00	17.00	17.00	17.00	17.00	16.60	15.00	15.00
1930	18.50	18.50	18.50	18.50	18.50	18.50	18.25	18.00	17.75	17.00	17.00	17.00
1929	17.50	17.50	17.60	18.00	18.30	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1928	17 00	17.00	17.00	16.75	16.20	15.80	15.95	16.00	16.10	16.85	17.70	17.50
1927	18 50	17.85	18.50	19.00	18.10	17.90	17.50	17.50	17.15	17.00	17.00	17.00
1926	20.00	19.50	21.00	19.80	19.25	19.00	18.70	18.00	18.25	19.10	19.25	19.75
1925	21.90	22.00	21.40	20.20	19.90	18.20	18.00	18.00	18.20	18.80	19.90	20.00
1924	21.40	22.00	21.70	21.70	20.70	20.00	19.00	19.00	19.00	19.00	19.25	20.50
1923	25.90	26.10	29.80	31.00	29.80	27.35	25.15	25.00	25.00	23.75	20.80	21.00
1922	18.30	17.95	17.95	20.20	24.65	25.00	25.00	27.40	32.90	30.50	28.10	25.20
1921	29.35	26.95	24.80	23.95	22.05	21.35	19.00	19.00	19.70	19.30	19.10	18.05
1920	38.20	42.25	43.00	43.00	43.25	43.65	45.75	48.50	48.50	45.25	34.90	33.00
1919	30.00	30.00	28.95	25.75	25.75	25.75	25.75	25.75	25.75	25.75	30.15	34.20
1918	33.00	33.00	33.00	32.00	32.00	32.00	32.00	32.00	32.00	33.00	33.00	33.00
1917	30.00	30.00	32.55	38.00	41.90	49.15	52.85	49.40	41.35	39.00	33.00	33.00
1916	17.85	18.00	18.25	18.00	18.15	18.00	18.00	18.00	18.65	20.30	27.25	30.00
1915	12.50	12.50	12.50	12.50	12.65	12.70	12.95	14.35	15.00	15.00	15.50	17.50
1914	12.35	13.05	13.05	13.00	13.00	13.00	14.00	13.00	13.00	12.85	12.50	12.50
1913	16.45	16.30	16.05	15.70	14.90	14.50	14.20	14.05	14.15	13.70	13.00	12.50
1912	12.40	12.25	12.75	13.00	13.00	13.20	13.50	14.00	15.15	16.20	16.20	16.45
1911	13.30	13.60	13.75	13.75	13.40	13.05	13.00	13.00	12.70	12.50	12.30	12.45
1910	16.90	16.30	16.00	15.95	15.05	14.70	14.50	14.00	13.85	13.15	13.35	13.45
1909	15.50	15.20	14.95	14.15	14.15	14.95	15.00	15.25	15.90	16.95	17.50	17.00
1908	17.10	17.00	16.00	16.00	14.85	15.25	14.50	14.60	14.25	14.25	14.95	15.50
1907	22.00	22.00	21.00	21.00	23.00	22.25	21.95	21.45	20.10	19.70	18.75	18.00
1906	17.00	16.70	17.00	17.15	17.25	17.50	17.25	17.75	18.40	19.30	21.00	23.00
1905	15.25	15.25	15.50	15.00	15.00	14.35	14.25	14.50	14.70	15.00	16.75	16.50
1904	12.85	12.50	12.90	13.10	12.50	11.65	11.35	11.75	11.65	12.05	13.95	14.65
1903	20.95	21.25	21.10	20.60	19.35	19.15	18.55	15.35	16.00	15.10	14.15	13.10
1902	19.75	16.15	16.50	17.50	15.75	20.65	20.60	20.60	20.65	20.70	20.90	20.90

Bessemer, delivered Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$19.26	$19.26	$19.26	$19.56	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76
1933	15.76	15.76	15.76	16.26	16.66	17.26	17.86	18.26	19.26	19.26	19.26	19.26
1932	17.26	16.96	16.76	16.76	16.15	15.95	15.76	15.76	15.76	15.76	15.76	15.76
1931	18.76	18.51	18.26	18.26	18.26	18.26	18.26	18.26	18.26	18.16	17.76	17.51
1930	20.76	20.76	20.76	20.76	20.76	20.76	20.46	20.26	24.13	19.36	18.63	18.76
1929	19.96	19.86	20.11	20.26	20.56	20.76	20.76	20.76	20.76	20.76	20.76	20.76
1928	19.26	19.26	19.21	19.26	19.26	18.76	18.76	18.76	18.86	19.11	19.96	20.01
1927	21.26	20.76	21.16	21.26	20.86	20.66	20.26	20.26	19.86	19.76	19.76	19.26
1926	22.76	22.76	22.76	21.56	21.01	20.76	20.46	19.76	19.96	20.86	22.01	21.51
1925	24.66	24.66	23.96	26.76	21.66	20.76	20.76	20.76	21.06	21.56	22.66	22.76
1924	24.66	25.01	24.86	24.61	24.06	23.26	21.66	21.76	21.76	21.76	22.11	23.26
1923	29.27	29.57	31.67	32.77	32.07	30.27	28.52	28.07	28.27	27.27	25.47	24.27
1922	21.51	21.31	21.21	22.46	26.46	26.96	26.76	29.16	35.27	35.12	27.77	30.33
1921	33.96	30.96	28.96	27.46	26.06	25.06	22.96	21.96	22.46	22.06	21.96	21.96
1920	40.00	43.15	43.40	43.50	43.90	44.25	46.80	49.50	50.45	50.17	42.33	36.96
1919	33.60	33.60	32.55	29.35	29.35	29.35	29.35	29.35	29.35	29.35	32.00	36.65
1918	37.25	37.25	37.25	36.15	36.15	36.40	36.60	36.60	36.60	36.60	36.60	36.60
1917	35.95	35.95	37.45	42.20	44.95	55.20	57.95	55.55	48.27	37.25	37.25	37.25
1916	21.32	21.45	21.55	21.95	21.95	21.95	21.95	21.95	22.20	24.33	30.35	35.95
1915	14.70	14.63	14.55	14.55	14.55	14.58	14.88	15.89	16.80	16.95	17.45	19.70
1914	15.00	15.09	15.15	14.90	14.90	14.90	14.90	14.90	14.90	14.85	14.70	14.70
1913	18.15	18.15	18.15	17.90	17.90	17.26	16.65	16.52	16.65	16.60	16.09	15.90
1912	15.15	15.00	15.02	15.15	15.15	15.15	15.15	15.43	15.93	17.75	18.05	18.15
1911	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.90	15.39	15.10	15.15
1910	19.90	19.42	18.90	18.15	17.09	16.73	16.40	16.21	15.90	15.90	15.90	15.90
1909	17.34	16.78	16.34	15.80	15.48	16.13	16.37	17.13	18.33	19.68	19.80	19.90
1908	19.00	17.90	17.86	17.49	16.92	16.90	16.73	16.11	15.90	15.48	16.74	17.40
1907	22.92	22.78	22.85	22.16	24.10	24.10	23.30	22.90	22.90	22.80	20.60	19.90
1906	17.32	17.29	17.26	17.25	17.24	17.38	17.57	17.96	18.44	20.06	21.96	22.75
1905	16.85	16.45	16.35	16.30	16.20	15.65	15.00	15.40	15.90	16.50	17.70	18.10
1904	13.60	13.35	13.85	14.10	13.60	12.60	12.50	12.65	12.75	13.35	15.25	16.60
1903	22.35	22.35	22.00	21.60	20.00	19.85	19.00	17.85	16.35	15.85	15.25	14.35
1902	16.70	16.93	17.56	18.37	20.95	21.25	22.00	21.75	21.75	21.95	22.25	22.12
1901	13.25	13.60	16.56	16.69	16.65	15.94	16.00	15.90	15.71	15.90	16.10	16.35
1900	24.90	24.90	24.90	24.90	24.90	19.75	18.00	16.05	14.00	13.25	13.65	13.55
1899	11.00	11.75	14.00	15.15	16.25	19.00	20.75	22.00	23.50	24.00	24.50	25.00
1898	9.90	10.15	10.40	10.50	10.50	10.40	10.35	10.40	10.40	10.30	10.20	10.65
1897	10.50	10.65	10.50	10.00	9.35	9.35	9.00	9.05	10.00	10.25	10.25	9.90
1896	12.30	12.80	12.00	13.15	12.75	12.40	12.20	11.45	11.25	11.50	12.30	11.40
1895	10.00	10.15	10.25	10.75	11.25	12.00	14.00	14.75	17.25	15.75	14.00	12.25

No. 2 Foundry, f.o.b. Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$17.50	$17.50	$17.50	$18.25	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50
1933	15.50	15.50	15.50	15.50	15.90	16.00	16.75	17.00	17.50	17.50	17.50	17.50
1932	16.50	16.50	16.50	16.00	15.60	16.00	15.50	15.50	15.50	15.50	15.50	15.50
1931	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.20	17.00	16.60
1930	20.00	20.00	19.50	19.40	19.00	18.40	17.90	17.50	17.50	17.50	17.50	17.50
1929	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928	18.50	18.50	18.50	18.50	18.70	18.00	17.60	17.60	18.25	18.80	20.00	20.00
1927	20.90	20.25	20.00	20.00	20.00	20.00	20.00	19.50	19.50	18.75	18.50	18.50
1926	23.00	23.00	23.00	22.00	21.65	21.10	21.00	21.00	21.00	21.00	21.00	21.00
1925	23.80	24.00	24.00	22.60	21.25	20.25	20.30	20.50	21.10	21.60	22.75	23.00
1924	23.70	24.40	24.50	24.40	22.80	21.40	19.80	20.40	20.50	20.50	21.00	22.00
1923	28.80	29.75	31.25	32.50	32.50	31.25	28.00	27.10	26.75	25.60	23.30	23.00
1922	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.00
1921	32.75	28.65	25.80	24.25	23.00	21.10	19.15	19.60	21.75	21.50	21.00	20.00
1920	40.00	42.25	43.00	43.00	43.00	43.00	44.40	46.00	46.00	46.00	42.40	36.50
1919	31.00	31.00	29.95	26.75	26.75	26.75	26.75	26.75	26.75	31.75	31.75	38.30
1918	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917	30.00	31.25	35.70	29.25	42.20	51.00	55.00	55.00	49.50	33.00	33.00	33.00
1916	18.50	18.50	18.70	19.00	19.00	19.00	19.00	19.00	18.65	19.15	25.00	29.25
1915	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	13.80	14.45	17.10	18.00
1914	14.25	14.20	14.25	14.25	14.25	14.20	14.00	14.00	13.65	13.30	13.00	13.00
1913	18.00	18.00	17.60	17.25	16.70	16.10	15.20	15.00	15.00	15.00	15.00	14.50
1912	14.00	14.00	14.00	14.25	14.50	14.50	14.60	15.30	16.35	17.30	17.85	18.00
1911	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.50	14.50	14.50	14.00	14.00
1910	19.00	18.75	18.25	17.00	16.75	16.50	16.50	16.50	16.50	16.00	16.00	16.00
1909	17.45	16.75	16.50	16.45	16.20	16.40	16.90	17.35	18.20	18.85	19.00	19.00
1908	18.25	17.85	17.40	17.20	17.00	17.30	17.00	17.00	16.75	16.50	16.75	17.35
1907	26.00	26.50	26.75	27.50	27.40	26.50	25.40	24.50	23.60	22.60	20.60	19.00
1906	19.25	19.25	19.00	18.75	18.50	18.10	18.30	18.90	19.75	21.50	26.50	27.00
1905	17.50	17.50	17.50	17.50	17.25	16.60	16.15	16.35	16.50	17.55	18.90	19.50
1904	14.10	13.75	13.55	14.00	13.80	13.40	13.30	13.35	13.40	13.70	15.60	16.60
1903	25.00	24.00	24.00	23.00	21.70	20.50	18.50	17.50	16.85	15.90	14.50	14.30
1902	15.80	16.75	18.60	19.75	21.75	22.50	23.40	24.65	27.15	27.15	26.90	25.40
1901	14.60	14.10	15.20	15.50	15.50	15.50	15.50	15.20	15.00	15.00	15.00	15.50
1900	24.50	24.50	23.75	23.25	22.00	20.25	17.75	15.50	14.50	14.00	14.25	14.60
1899	11.25	12.00	14.25	15.00	15.25	17.00	17.00	20.00	22.00	23.00	23.50	24.50
1898	10.50	10.50	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1897	11.00	10.75	10.75	10.75	10.25	10.00	10.00	10.00	10.25	10.75	10.75	10.50
1896	13.50	12.25	12.00	12.00	11.75	11.25	11.25	11.20	10.80	10.75	11.10	11.25
1895	9.75	9.75	9.75	10.00	10.25	10.75	12.50	13.50	13.50	14.50	14.50	14.00

No. 2 Foundry, f.o.b. Valley

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$17.50	$17.50	$17.50	$18.25	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50
1933	14.50	14.50	14.50	14.50	14.75	15.50	16.10	16.50	17.50	17.50	17.50	17.56
1932	15.50	15.50	15.00	15.00	14.80	14.50	14.50	14.50	14.50	14.50	14.50	14.50
1931	17.00	16.75	16.90	17.00	17.00	17.00	17.00	17.00	17.00	16.85	16.00	15.50
1930	18.50	18.50	18.50	18.50	18.50	17.63	18.00	18.00	17.75	17.20	17.00	17.00
1929	17.50	17.50	17.75	18.15	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
1928	17.25	17.25	17.25	17.25	17.10	16.75	16.50	16.50	16.85	17.00	17.70	18.00
1927	18.43	18.06	18.37	18.50	18.50	18.20	17.50	17.50	17.50	17.50	17.45	17.25
1926	20.50	20.50	20.50	19.30	19.00	18.00	17.80	17.50	17.70	18.35	19.60	19.00
1925	22.25	22.00	21.25	20.20	18.85	18.50	18.50	18.75	19.20	20.40	20.40	20.50
1924	22.40	23.00	22.50	21.75	20.90	19.50	19.00	19.25	19.50	19.50	19.60	20.50
1923	27.00	27.00	29.60	31.00	30.15	27.75	25.60	24.70	24.75	23.40	22.00	22.00
1922	20.05	19.20	19.20	20.55	23.95	24.20	24.20	31.00	35.25	31.85	28.40	25.00
1921	31.10	28.20	26.20	25.05	23.80	22.50	20.30	20.10	21.20	21.20	20.05	20.35
1920	40.90	42.40	43.40	44.20	45.40	45.40	46.40	49.65	50.95	48.95	42.95	37.20
1919	31.00	31.00	29.10	26.75	26.75	28.15	28.15	28.15	29.50	34.95	33.35	38.15
1918	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	34.00	34.00
1917	32.35	34.25	37.20	39.99	42.95	51.40	55.90	54.70	49.05	33.00	33.00	33.00
1916	18.90	18.75	18.75	18.90	18.70	18.50	18.50	18.50	18.65	20.75	26.10	31.30
1915	13.25	13.25	13.25	12.95	12.75	12.75	12.85	13.95	14.75	14.85	15.90	17.50
1914	12.89	13.25	13.40	13.50	13.50	13.50	13.50	13.30	13.25	13.10	12.90	13.05
1913	17.50	17.30	16.75	15.80	14.80	14.15	13.85	13.80	14.00	13.90	13.90	13.50
1912	13.00	13.10	13.20	13.35	13.30	13.30	13.50	13.85	14.50	16.15	17.30	17.50
1911	18.75	13.75	13.85	13.85	14.75	13.60	13.50	13.50	13.50	13.50	13.15	12.80
1910	17.00	16.55	16.10	15.75	15.35	14.65	14.20	14.10	14.40	13.95	13.75	13.75
1909	15.35	15.00	14.85	14.25	14.35	14.85	15.25	15.35	16.25	17.10	17.25	17.25
1908	16.35	16.00	15.70	15.10	14.50	15.35	15.10	15.00	14.60	14.20	15.50	15.50
1907	23.30	24.00	24.00	24.00	24.50	24.50	23.15	22.55	21.30	20.05	19.15	17.05
1906	17.55	17.25	17.15	16.75	16.65	16.25	16.50	18.00	19.00	20.50	23.00	23.75
1905	16.50	16.15	16.00	16.15	15.75	14.35	14.35	14.55	14.75	15.65	16.85	17.25
1904	12.50	12.25	13.00	12.90	12.15	11.65	11.50	11.65	11.75	12.40	15.00	16.00

No. 2X Foundry, delivered Philadelphia

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$19.63	$19.63	$19.63	$20.38	$20.63	$20.63	$20.63	$20.63	$20.63	$20.63	$20.63	$20.63
1933	13.76	13.76	13.76	14.51	15.91	16.76	17.28	17.88	18.63	18.63	18.63	19.63
1932	15.76	15.76	15.76	15.66	15.13	14.76	14.76	14.51	14.26	14.16	13.95	13.88
1931	18.26	18.26	18.26	18.26	17.76	17.76	17.76	17.51	17.01	16.01	16.01	15.76
1930	21.56	21.26	20.76	20.76	20.26	20.26	20.26	19.76	19.76	19.26	19.13	18.26
1929	22.26	22.01	22.26	22.26	22.76	22.76	22.76	22.26	22.26	22.26	22.26	21.76
1928	20.51	20.91	21.26	21.26	21.26	21.26	20.76	20.76	21.01	21.76	21.51	21.76
1927	22.76	22.26	22.26	22.26	22.26	22.01	21.51	21.26	21.01	20.66	20.51	20.26
1926	24.26	24.01	23.26	23.26	23.01	22.76	22.26	22.01	22.26	22.51	23.51	23.76
1925	25.61	25.26	24.51	23.16	21.76	21.51	21.26	21.76	21.86	22.61	24.01	24.26
1924	24.26	24.26	24.13	23.73	22.60	21.76	21.76	21.76	21.26	21.36	22.98	24.88
1923	29.56	30.10	32.00	32.75	32.75	30.60	28.00	25.80	26.20	24.50	23.00	24.26
1922	21.55	21.35	23.60	23.75	25.60	27.20	27.90	32.15	34.25	33.00	30.50	28.45
1921	35.00	31.00	27.40	26.25	26.10	26.00	23.50	21.00	21.40	22.00	22.50	22.10
1920	42.90	45.00	45.68	46.80	46.90	46.90	48.55	50.95	53.75	52.65	46.75	38.95
1919	36.15	36.15	35.10	31.00	30.10	29.60	29.50	29.60	29.95	32.00	35.85	40.75
1918	34.25	34.25	34.25	34.25	34.25	34.25	34.50	34.50	34.50	38.85	39.15	39.15
1917	30.50	31.75	36.90	41.75	43.35	47.50	54.35	53.40	47.80	34.00	34.00	34.00
1916	19.75	20.00	20.00	20.75	20.50	19.75	19.75	19.75	19.75	20.50	25.25	30.00
1915	14.25	14.25	14.25	14.25	14.00	14.25	14.50	15.25	16.25	16.50	17.50	19.25
1914	14.75	15.00	15.00	15.00	14.75	14.75	14.75	14.75	14.75	14.50	14.25	14.25
1913	18.25	18.00	17.75	17.50	17.00	16.25	15.50	15.75	16.00	15.75	15.50	15.00
1912	15.00	15.00	15.00	15.25	15.25	15.50	15.75	16.00	16.50	17.50	18.00	18.25
1911	15.50	15.50	15.75	15.50	15.25	15.00	15.00	15.00	15.00	15.00	14.85	14.75
1910	19.00	18.40	18.25	17.75	17.25	16.75	16.00	16.00	16.00	15.75	15.50	15.50

No. 2X Foundry, f.o.b. Buffalo

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$17.50	$17.50	$17.50	$18.25	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50
1933	16.50	16.50	16.50	16.50	16.50	16.50	17.10	17.15	17.50	17.50	17.50	17.50
1932	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50
1931	18.00	18.00	18.00	18.00	17.60	17.50	17.50	17.50	17.50	17.50	17.50	17.50
1930	19.40	19.00	19.00	19.00	19.00	19.00	19.00	18.75	19.00	18.40	18.00	18.00
1929	19.00	19.00	19.25	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	18.00	19.00	19.00
1927	19.75	18.90	18.15	18.00	18.00	17.90	17.50	17.45	18.00	18.00	17.60	17.50
1926	21.50	21.50	21.50	21.50	21.25	20.50	19.80	20.00	20.00	20.00	20.00	20.00
1925	23.50	22.75	22.50	20.90	19.25	19.00	19.00	19.00	19.00	19.50	21.25	21.50
1924	23.10	22.75	22.00	21.50	20.50	19.90	19.30	19.10	19.50	19.60	20.90	22.00
1923	28.00	28.50	29.40	30.10	29.80	29.50	26.60	25.50	25.25	23.00	20.70	22.00
1922	19.80	19.15	18.30	20.75	23.00	23.85	25.35	31.50	33.75	31.50	27.85	26.00
1921	33.75	31.25	28.25	26.75	26.25	23.85	21.75	21.25	21.05	20.40	20.00	20.00
1920	41.50	44.60	45.15	46.25	46.25	46.25	46.25	48.75	51.25	51.25	46.00	48.25
1919	32.25	32.25	31.45	28.00	28.00	28.00	28.00	28.70	28.75	29.90	34.45	39.50
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	35.25
1917	35.00	35.00	38.15	40.00	42.75	49.15	53.50	54.00	49.05	33.50	33.50	33.50
1916	18.50	18.60	18.85	19.15	19.00	18.75	18.75	18.75	18.90	20.70	26.65	33.65
1915	13.15	13.05	12.55	12.75	12.75	12.75	12.80	13.70	15.15	15.80	16.70	18.00
1914	13.00	13.00	13.75	13.90	13.50	13.05	13.05	13.20	13.25	12.60	12.45	13.10
1913	17.25	17.00	17.00	16.50	15.50	14.75	14.00	14.00	14.25	14.00	14.00	14.00

Southern No. 2, f.o.b Birmingham

Local delivery

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$13.50	$13.50	$13.50	$14.25	$14.50	$14.50	$14.50	$14.50	$14.50	$14.50	$14.50	$14.50
1933	11.00	11.00	11.00	11.40	12.00	12.00	12.60	13.00	13.50	13.50	13.50	13.50
1932	12.00	11.20	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1931	14.00	13.00	13.00	13.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
1930	14.70	15.00	14.50	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
1929	16.50	16.50	16.00	15.50	15.50	15.25	14.00	14.00	14.00	14.00	14.00	14.00
1928	16.00	16.00	16.00	16.00	16.00	15.90	15.50	15.65	16.25	16.25	16.30	16.50
1927	18.50	18.00	18.00	18.00	18.00	18.00	17.43	17.25	17.25	17.25	16.00	16.00
1926	22.75	22.00	22.00	22.00	22.00	21.00	21.00	21.00	20.80	20.00	20.00	20.00
1925	20.10	20.75	21.00	20.00	20.00	19.00	18.00	18.00	18.50	19.50	21.00	21.20
1924	21.60	23.00	23.00	22.20	21.60	20.00	18.20	17.90	17.65	17.50	17.90	19.50
1923	23.30	24.50	26.50	27.00	27.00	26.75	25.00	23.60	22.75	20.20	19.25	21.00
1922	16.15	19.25	15.25	16.00	17.60	18.50	18.50	20.70	26.25	27.40	24.00	22.50
1921	33.75	27.70	25.10	23.00	22.50	21.70	20.25	19.00	19.00	19.00	18.25	17.00
1920	38.20	40.00	40.00	40.00	42.00	42.30	42.30	42.00	42.00	42.00	39.50	38.00
1919	31.00	31.00	30.00	26.75	26.25	25.25	25.00	26.75	26.75	27.45	30.65	35.10
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	35.25
1917	23.00	24.50	28.00	35.80	35.75	35.75	46.00	48.00	43.50	33.50	33.50	33.50
1916	14.50	14.65	15.00	15.00	15.00	14.45	14.00	13.60	14.40	15.15	19.60	23.00
1915	9.50	9.50	9.40	9.35	9.75	9.55	9.60	11.00	11.30	11.75	13.15	14.20
1914	10.50	10.50	10.60	10.50	10.50	10.45	10.05	10.00	10.00	10.00	9.90	9.50
1913	13.70	13.50	13.00	12.50	11.75	10.60	10.50	11.00	11.00	11.00	10.75	11.00
1912	10.00	10.00	10.05	10.50	10.95	11.00	11.25	11.65	12.50	13.45	13.75	13.50
1911	11.00	11.00	11.00	11.00	10.75	10.25	10.00	10.05	10.10	10.00	9.75	10.00
1910	14.00	13.90	13.00	12.10	11.80	11.60	11.40	11.00	11.00	11.00	11.00	11.00
1909	13.00	12.70	11.75	11.00	11.00	11.30	12.30	13.00	14.00	14.50	14.50	14.00
1908	12.80	12.50	12.10	11.90	11.50	12.00	11.60	12.05	12.50	12.50	12.50	13.00
1907	23.00	23.00	22.75	22.00	21.40	21.25	20.50	19.80	18.10	17.65	16.00	14.90
1906	14.00	14.00	13.70	13.65	13.75	13.50	13.00	14.15	16.00	17.15	21.25	22.00
1905	13.50	13.50	13.50	13.25	12.75	11.85	11.00	11.65	11.75	12.50	14.00	14.00
1904	9.75	9.50	9.70	10.00	9.65	9.15	9.15	9.50	9.50	10.65	12.75	13.05

Malleable, f.o.b. Valley

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$17.50	$17.50	$17.50	$18.10	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50
1933	14.50	14.50	14.50	14.50	14.90	15.50	16.10	16.50	17.50	17.50	17.50	17.50
1932	16.00	15.50	15.50	15.50	15.00	14.50	14.50	14.50	14.50	14.50	14.50	14.50
1931	17.50	17.25	17.00	17.00	17.00	17.00	17.00	17.00	17.00	16.90	16.50	16.00
1930	19.00	19.00	19.00	19.00	19.00	19.00	18.75	18.50	18.35	17.80	17.50	17.50
1929	18.00	18.00	18.10	18.50	18.80	19.00	19.00	19.00	19.00	19.00	19.00	19.00
1928	17.25	17.25	17.25	17.25	17.25	17.00	17.00	17.00	17.10	17.35	17.90	18.00
1927	18.50	18.10	18.40	18.50	18.50	18.25	17.50	17.50	17.50	17.50	17.50	17.25
1926	20.50	20.50	20.50	19.30	19.00	18.00	17.80	17.50	17.70	18.35	19.75	19.00
1925	22.75	22.25	21.25	20.10	19.00	18.50	18.50	18.50	18.80	19.35	20.35	20.50
1924	22.00	23.00	22.50	22.20	21.30	19.75	19.00	19.00	19.50	19.50	19.75	20.50
1923	27.25	27.25	29.20	31.00	30.20	28.25	25.50	24.70	24.60	23.25	20.40	22.00
1922	19.45	19.00	19.00	20.40	24.60	24.50	25.00	28.60	34.00	32.30	29.25	26.25
1921	32.25	28.75	26.40	24.90	23.75	22.60	20.40	20.00	20.40	20.20	20.00	20.00
1920	38.95	41.60	42.35	41.60	41.60	41.85	43.40	48.25	50.50	48.25	40.40	36.00
1919	31.50	31.50	30.45	27.25	27.25	27.25	27.25	27.25	27.25	27.75	31.75	36.40
1918	33.50	33.50	34.45	34.45	34.45	34.65	34.90	34.90	34.90	34.50	34.50	34.50
1917	31.00	33.50	36.00	39.00	42.70	40.10	53.00	54.00	49.60	34.25	33.50	33.50
1916	19.00	18.65	18.50	18.50	18.50	18.50	18.50	18.50	18.55	20.15	25.85	30.75
1915	12.75	12.75	12.85	12.50	12.50	12.50	12.65	13.75	14.50	14.60	15.50	17.90
1914	13.15	13.19	14.15	13.25	13.25	13.00	13.00	13.00	13.00	12.90	12.75	12.75
1913	17.25	17.20	16.75	15.75	14.85	14.40	14.15	14.00	14.05	14.25	13.85	13.50

Malleable, f.o.b. Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$17.50	$17.50	$17.50	$18.10	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50	$18.50
1933	15.50	15.50	15.50	15.50	15.90	16.00	16.50	17.00	17.50	17.50	17.50	17.50
1932	16.50	16.50	16.50	16.00	15.60	16.00	15.50	15.50	15.50	15.50	15.50	15.50
1931	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.10	17.00	16.60
1930	20.00	20.00	19.50	19.40	19.00	18.40	17.90	17.50	17.50	17.50	17.50	17.00
1929	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1928	18.50	18.50	18.50	18.50	18.20	18.00	17.60	17.60	18.25	18.80	20.00	20.00
1927	20.50	20.25	20.00	20.00	20.00	20.00	20.00	19.50	19.50	18.75	18.50	18.50
1926	23.00	23.00	23.00	22.00	21.65	21.10	21.00	21.00	21.00	21.00	21.00	21.00
1925	24.00	24.00	24.00	22.70	21.25	20.25	20.50	20.50	21.10	21.60	22.75	23.00
1924	23.70	24.40	24.50	24.40	22.80	21.40	19.80	20.40	20.50	20.50	21.00	22.00
1923	28.80	29.75	31.25	32.50	32.50	31.25	28.00	27.10	26.75	25.60	23.30	23.00
1922	19.00	18.90	20.00	20.50	22.60	23.25	24.65	28.60	32.00	31.75	30.60	28.25
1921	33.25	29.00	26.25	24.75	23.50	21.20	19.15	19.40	21.75	21.20	21.00	20.00
1920	40.50	42.75	43.50	43.50	43.50	43.50	44.90	46.50	46.60	46.50	43.00	37.50
1919	31.50	31.50	30.45	27.25	27.25	27.25	27.25	27.25	27.25	28.00	32.25	38.80
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	34.50	34.50	34.50
1917	30.00	31.25	35.80	39.00	43.20	50.50	55.00	55.00	49.50	33.35	33.50	33.50
1916	19.00	19.00	19.00	19.50	19.50	19.50	19.50	19.50	19.15	19.50	25.00	29.25
1915	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	14.20	15.10	17.40	18.00
1914	14.25	14.25	14.25	14.25	14.25	14.25	14.00	14.00	13.50	13.50	13.00	13.00
1913	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.40

Basic, delivered Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$18.76	$18.76	$18.76	$19.51	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76	$19.76
1933	13.50	13.50	13.50	14.19	15.99	18.19	16.79	17.20	17.76	17.76	17.76	18.76
1932	16.00	15.75	15.75	15.00	15.00	14.50	14.35	13.90	13.75	13.60	13.50	13.50
1931	17.25	17.25	17.25	17.25	17.00	17.00	16.75	16.75	16.00	16.00	16.00	16.00
1930	19.20	19.00	18.80	18.76	18.75	18.75	18.00	18.00	17.87	17.50	17.50	17.50
1929	20.15	20.50	20.25	20.25	20.50	20.25	19.85	19.85	19.85	19.75	19.75	19.75
1928	19.50	19.50	19.50	19.25	19.10	19.10	19.00	19.00	19.00	19.75	19.75	19.75
1927	21.25	21.00	21.00	20.90	20.75	20.75	20.50	19.75	19.75	19.50	19.50	19.25
1926	22.75	22.50	22.20	21.76	21.76	21.76	21.00	21.00	20.76	21.00	22.50	22.75
1925	24.25	24.20	24.05	22.65	21.45	21.50	21.50	20.55	20.50	20.50	22.70	23.00
1924	22.50	22.50	21.50	21.35	20.75	20.60	20.50	20.00	20.00	20.00	21.46	22.50
1923	27.70	28.15	29.35	30.75	30.75	28.15	27.25	25.10	25.10	24.00	22.60	23.30
1922	20.25	19.85	19.90	21.70	24.55	25.25	26.00	29.50	30.00	30.25	28.00	27.65
1921	33.35	29.95	26.20	25.00	25.00	24.70	22.25	20.70	19.50	20.50	20.90	20.25
1920	39.75	40.50	43.00	43.70	44.00	44.05	44.10	47.45	51.15	50.75	44.55	34.75
1919	33.90	33.90	32.85	29.65	28.80	25.50	26.60	27.00	27.00	27.90	33.00	35.75
1918	33.90	33.90	33.90	32.90	32.90	32.90	32.90	32.90	32.90	36.60	36.90	36.90
1917	30.15	30.50	33.80	38.25	40.80	46.40	50.75	51.00	46.50	33.50	33.50	33.50
1916	19.50	19.50	20.00	20.50	20.00	19.25	19.00	19.95	20.00	21.00	25.50	30.50
1915	13.50	13.75	14.00	13.25	13.50	13.50	13.75	15.25	17.25	17.50	17.75	18.00
1914	14.00	14.25	14.25	14.25	14.00	14.00	14.00	14.00	14.00	14.00	13.50	13.50
1913	18.25	18.00	17.50	16.50	16.50	16.00	15.25	15.00	15.25	15.25	15.00	14.25
1912	14.25	14.25	14.25	15.00	15.00	15.25	15.50	16.25	16.50	17.50	18.00	18.25
1911	14.50	15.00	15.25	15.25	14.75	14.50	14.50	14.50	14.50	14.50	14.25	14.25
1910	18.75	18.50	18.00	17.50	16.25	15.75	15.50	15.00	15.00	14.50	14.50	14.50
1909	16.40	16.10	15.85	15.05	15.00	15.85	15.90	16.15	16.80	17.85	18.36	18.15

Standard Low Phosphorus, delivered Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$24.13	$24.13	$24.13	$24.13	$24.63	$24.63	$24.63	$24.63	$24.63	$24.63	$24.63	$24.63
1933	20.75	20.50	20.50	20.50	21.68	22.00	22.80	23.50	23.13	23.13	23.13	24.13
1932	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76
1931	24.76	24.76	24.76	24.76	24.76	23.76	23.76	23.76	23.76	23.76	23.76	23.76
1930	24.76	24.76	24.76	24.76	24.76	24.26	24.26	24.26	24.76	24.76	24.76	24.76
1929	24.26	24.26	24.26	24.26	24.26	24.26	24.26	24.26	24.76	24.76	24.76	24.76
1928	24.76	24.76	24.76	24.76	24.76	24.51	24.51	24.51	24.26	24.26	24.26	24.26
1927	25.76	25.76	25.76	25.76	25.76	25.76	25.76	25.26	25.26	25.26	24.76	24.76
1926	24.76	24.76	24.76	24.76	24.76	24.26	24.26	24.26	24.51	24.76	25.76	25.76
1925	26.76	26.76	26.76	26.26	25.26	25.26	25.26	25.26	24.01	24.51	24.76	24.76
1924	27.76	27.76	26.76	27.86	27.26	27.26	27.26	26.26	26.26	26.26	26.76	29.79
1923	29.75	31.35	35.45	34.45	35.80	34.80	33.80	32.80	30.50	30.50	30.00	29.76
1922	35.00	34.00	34.00	34.00	35.35	35.35	35.15	38.00	40.00	40.00	40.00	40.00
1921	47.70	46.80	46.80	44.15	43.30	43.30	43.30	43.30	43.30	43.30	43.30	35.30
1920	51.60	53.55	53.80	53.80	54.80	60.20	57.80	59.60	65.30	65.30	*65.30	*65.30
1919	51.00	51.00	49.90	46.75	45.80	42.25	41.10	40.25	40.25	40.35	43.00	47.50
1918	55.50	55.50	55.50	55.50	55.50	55.50	56.00	56.00	56.00	57.00	57.00	57.00
1917	54.50	57.50	66.70	75.50	77.00	85.00	92.50	92.50	82.00	55.50	55.50	55.50
1916	32.00	32.00	32.00	33.00	34.00	34.00	33.00	33.00	34.00	40.00	46.00	55.00
1915	19.00	19.00	20.00	20.00	20.00	20.50	21.50	23.50	24.50	28.00	30.00	32.00
1914	21.00	21.00	21.00	21.00	21.00	20.50	20.50	21.00	21.00	21.00	19.00	19.00
1913	24.50	24.50	24.00	23.50	23.50	23.50	23.50	23.00	23.00	23.00	21.50	21.00
1912	19.25	19.00	19.00	19.50	19.75	19.75	20.00	21.00	21.50	22.50	24.00	24.50
1911	21.50	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.25	19.50	19.25

*Nominal.

No. 2X, f.o.b. Virginia Furnace

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1933	$17.75	$17.75	$17.75	$17.75	$17.75	$17.75	$17.75		Not offered after July			
1932	18.00	18.00	18.00	18.00	18.00	18.00	18.00	17.75	17.75	17.75	17.75	17.75
1931	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.00	18.00	18.00
1930	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25	18.25
1929	21.25	21.25	21.00	20.75	20.75	20.00	20.00	20.00	20.00	19.65	18.25	18.25
1928	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	21.25
1927	21.75	22.00	22.00	22.00	22.00	22.00	22.00	21.50	21.50	21.50	21.25	21.00
1926	23.50	23.25	23.25	23.25	23.00	23.00	22.75	22.75	23.00	22.50	22.75	23.00
1925	24.50	24.50	24.50	23.90	23.35	23.00	23.00	23.00	23.00	23.00	23.00	23.30
1924	25.00	25.75	26.00	25.50	25.50	25.50	24.50	24.50	24.50	24.50	24.50	25.00
1923	27.50	27.50	28.25	29.25	28.60	28.00	27.25	26.25	25.50	25.00	25.00	24.50
1922	21.75	22.00	22.50	22.85	23.50	24.50	26.00	26.00	33.00	33.00	31.40	27.75
1921	34.50	31.25	28.05	27.10	27.00	26.00	24.50	24.00	23.00	23.25	22.80	22.50
1920	41.25	42.75	43.25	44.25	45.75	46.25	46.75	49.25	50.25	49.75	45.75	42.05
1919	35.25	33.00	31.55	28.45	27.50	26.50	26.50	28.25	29.25	30.35	33.40	38.25
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	37.50	38.00	38.00
1917	26.50	28.25	34.25	38.30	41.00	46.50	52.25	51.90	46.50	33.50	33.50	33.50
1916	17.25	18.00	18.25	18.50	18.50	18.50	18.50	18.50	17.50	18.50	23.75	27.00
1915	12.50	12.50	12.50	12.50	12.50	12.50	12.50	13.00	13.50	14.00	15.50	17.00
1914	12.75	12.75	12.75	12.75	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50
1913	16.00	15.50	15.50	15.00	14.50	13.75	13.00	13.00	13.00	13.00	13.00	12.75
1912	12.25	12.25	12.25	13.00	13.00	13.25	13.50	14.00	14.50	15.50	16.00	16.00
1911	12.75	12.75	13.00	13.00	13.0	12.25	12.25	12.25	12.25	12.25	12.25	12.25

Lake Superior Charcoal, delivered Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$23.54	$23.54	$23.54	$23.66	$24.04	$24.04	$24.04	$24.04	$24.04	$24.04	$24.04	$24.04
1933	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.54	23.54	23.54	23.54
1932	22.29	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04	23.04
1931	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	25.54	25.04	25.04	20.79
1930	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1929	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1928	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1927	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04
1926	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	27.04	27.04	27.04
1925	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04
1924	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04
1923	33.15	33.53	35.53	36.55	36.55	36.65	36.62	32.10	32.04	30.04	28.65	29.04
1922	31.50	30.50	26.90	26.50	28.40	30.00	31.65	33.75	36.15	36.15	36.15	36.15
1921	40.25	38.50	38.50	38.50	38.50	38.50	36.87	34.30	33.25	32.50	32.25	31.50
1920	48.75	55.65	57.50	57.50	57.50	57.50	57.50	57.60	58.30	58.50	58.50	53.50
1919	38.70	38.70	38.70	33.25	31.75	31.75	31.75	32.75	32.75	33.15	35.50	41.00
1918	37.50	37.50	37.50	37.50	37.50	37.50	37.70	37.70	37.70	37.70	38.70	38.70
1917	33.75	34.50	37.55	42.25	49.25	51.80	59.50	59.50	59.50	48.50	37.50	37.50
1916	19.25	19.50	19.75	19.75	19.75	19.75	19.75	19.75	19.75	20.35	21.95	31.75
1915	15.75	15.75	15.75	15.75	15.25	15.25	15.75	15.75	15.95	16.25	17.50	19.25
1914	15.50	15.50	15.50	15.50	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75
1913	18.25	18.00	18.00	18.00	18.00	16.75	16.75	15.00	15.00	15.75	15.50	15.50
1912	16.50	16.50	16.50	15.50	15.75	15.75	16.25	16.75	17.75	18.75	18.75	18.75
1911	17.50	17.50	17.50	17.50	17.00	17.00	17.00	17.00	17.00	17.00	16.50	16.50
1910	19.50	19.50	19.00	19.00	19.00	18.50	18.50	18.50	18.50	18.00	18.00	17.50
1909	19.50	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70
1908	22.80	21.50	21.50	21.10	19.85	19.50	19.50	19.50	19.50	19.50	19.50	19.50
1907	25.50	26.75	25.50	26.00	27.10	27.40	27.10	27.00	26.75	26.10	25.25	23.50

Semifinished Material

Per Gross Ton f.o.b.

Bessemer Billets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$26.00	$26.00	$26.00	$27.80	$29.00	$29.00	$27.40	$27.00	$27.00	$27.00	$27.00	$27.00
1933	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1932	27.50	27.00	27.00	27.00	27.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1931	30.00	30.00	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	33.00	34.25	34.00	34.50	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	33.00	33.00	33.00	33.00	33.00	32.50	32.25	32.00	32.00	32.75	33.00	33.00
1927	35.00	34.00	33.60	33.50	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
1926	35.50	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1925	37.40	37.60	37.75	35.80	35.35	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1924	40.00	40.00	40.00	40.00	39.20	38.00	38.00	38.00	37.10	36.60	35.50	35.50
1923	37.50	38.85	44.50	46.00	45.00	42.90	42.50	42.50	42.50	41.50	41.50	40.00
1922	29.00	28.00	28.30	30.10	34.50	35.00	35.00	35.00	39.50	40.00	38.80	36.50
1921	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
1920	49.60	61.25	65.00	68.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	62.50	64.85	69.30	75.20	88.65	95.60	102.25	92.25	74.05	58.75	47.50	47.50
1916	34.05	35.50	41.10	46.25	46.10	43.00	42.50	45.15	47.50	48.10	53.10	59.50
1915	19.75	20.00	20.00	20.00	20.05	20.35	21.45	23.00	24.70	25.20	27.10	30.75
1914	20.00	20.90	21.05	21.05	20.00	19.80	19.55	20.05	21.00	20.40	19.25	18.85
1913	28.90	28.90	29.00	29.00	27.80	26.75	26.75	26.30	25.00	23.00	21.10	20.10
1912	20.00	20.00	19.90	20.00	21.10	21.90	22.25	22.40	23.75	25.70	26.75	27.00
1911	23.00	23.00	23.00	23.00	23.00	21.00	21.00	21.00	21.00	20.00	19.70	19.25
1910	27.87	27.50	27.50	27.00	26.10	25.50	25.00	25.00	24.50	23.40	23.00	23.00
1909	25.00	23.50	23.00	22.00	22.50	23.00	24.00	25.00	26.00	26.50	27.50	27.50
1908	28.00	28.00	28.00	28.00	28.00	26.50	25.00	25.00	25.00	25.00	25.00	25.00
1907	29.75	29.50	29.25	29.75	30.25	31.00	30.00	30.00	29.50	28.50	28.00	28.00
1906	27.00	27.50	27.65	27.75	27.00	26.25	27.00	28.00	28.50	28.50	29.00	29.75
1905	21.00	24.90	24.60	25.50	23.50	22.00	22.00	23.50	25.75	25.95	26.30	26.50
1904	23.00	23.00	23.00	23.00	22.00	21.50	21.00	20.00	19.50	19.50	21.00	21.00
1903	29.75	30.00	30.25	31.00	30.50	29.50	27.50	27.00	27.00	26.50	23.50	23.00
1902	28.05	29.80	31.35	32.25	33.90	35.20	33.50	32.10	31.50	29.80	29.00	29.25
1901	19.70	19.75	20.80	24.10	24.20	24.45	24.25	24.40	24.10	26.80	28.25	27.60
1900	35.00	35.00	35.00	34.50	29.00	27.25	22.50	18.00	17.50	17.50	19.30	19.75
1899	16.75	18.25	24.00	25.50	27.00	31.50	33.50	36.50	39.00	37.50	36.00	35.00
1898	15.00	15.00	15.25	15.25	14.85	14.75	14.75	15.45	16.10	15.75	15.25	16.00
1897	15.25	15.50	15.50	14.75	14.00	14.25	14.00	14.15	15.75	16.50	15.75	15.00
1896	17.05	17.65	17.50	18.90	19.50	19.75	19.90	19.75	19.60	20.25	20.00	17.00
1895	14.85	15.00	14.85	15.40	16.75	18.75	20.85	22.00	24.25	22.00	19.50	17.00

Open-Hearth Billets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$26.00	$26.00	$26.00	$27.80	$29.00	$29.00	$27.40	$27.00	$27.00	$27.00	$27.00	$27.00
1933	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1932	27.50	27.00	27.00	27.00	27.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1931	30.00	30.00	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	33.00	34.25	34.00	34.50	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	33.00	33.00	33.00	33.00	33.00	32.50	32.25	32.00	32.00	32.75	33.00	33.00
1927	35.00	34.00	33.60	33.50	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
1926	35.50	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1925	37.75	37.65	37.75	35.80	35.40	33.90	35.00	35.00	35.00	35.00	35.00	35.00
1924	40.00	40.00	40.00	40.00	39.20	38.00	38.00	38.00	37.10	36.60	35.50	35.50
1923	37.50	38.85	44.50	46.00	45.00	42.90	42.50	42.50	42.50	41.50	41.50	40.00
1922	29.00	28.00	28.30	30.10	34.50	35.00	35.00	35.00	39.50	40.00	38.80	36.50
1921	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
1920	49.60	61.25	66.25	70.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	60.00	62.50	67.00	72.50	85.00	93.75	100.00	93.00	73.75	58.75	47.50	47.50
1916	34.75	35.00	40.60	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	19.50	19.50	19.50	19.50	19.50	19.85	21.50	24.00	25.60	26.50	28.00	30.20
1914	20.00	20.75	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
1913	28.70	29.40	29.50	29.50	28.10	26.50	26.50	26.10	25.00	23.00	20.85	20.00
1912	19.75	19.50	19.40	20.25	21.00	21.25	21.75	21.75	21.75	21.75	21.75	28.00
1911	23.00	23.00	23.00	23.00	22.00	21.00	21.00	21.00	20.25	19.50	19.75	19.25
1910	28.00	28.00	28.50	28.75	28.75	27.00	26.50	26.00	25.00	24.00	23.25	23.00

Open-Hearth Sheet Bars, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$26.00	$26.00	$26.00	$28.40	$30.00	$30.00	$28.40	$28.00	$28.00	$28.00	$28.00	$28.00
1933	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1932	27.50	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1931	30.00	30.00	30.00	30.00	29.75	29.00	29.00	29.00	29.00	29.00	29.00	28.50
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	34.00	33.25	35.00	35.25	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	34.00	34.00	33.70	34.00	34.00	33.50	32.25	32.20	33.00	33.00	33.60	34.00
1927	36.00	35.00	34.00	33.75	33.75	33.50	33.50	33.50	33.90	34.00	34.00	34.00
1926	36.50	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
1925	39.25	39.00	38.25	37.00	36.25	35.00	35.00	35.00	35.00	35.00	35.00	36.80
1924	42.50	42.50	42.50	42.10	40.60	40.00	39.20	38.00	37.50	37.20	37.00	37.00
1923	37.50	39.25	44.50	45.85	45.40	42.90	42.50	42.50	42.50	42.50	42.50	42.50
1922	30.00	29.00	29.40	31.50	35.00	35.00	35.00	35.00	39.50	39.85	38.80	36.50
1921	47.00	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
1920	53.40	65.00	72.50	78.00	78.75	75.00	75.00	71.25	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	42.00	45.00	48.00
1918	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1917	60.00	62.50	67.50	72.00	88.00	101.25	105.00	96.00	82.50	65.50	57.00	51.00
1916	34.75	35.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	59.00
1915	20.00	20.00	20.00	19.60	20.00	20.35	22.00	25.00	25.80	26.50	28.50	30.80
1914	20.60	21.75	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	29.20	29.00	30.00	30.00	28.80	27.50	27.50	27.10	25.60	23.80	21.75	21.00

Bessemer Sheet Bars, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$26.00	$26.00	$26.00	$28.40	$30.00	$30.00	$28.40	$28.00	$28.00	$28.00	$28.00	$28.00
1933	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1932	27.50	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
1931	30.00	30.00	30.00	30.00	29.75	29.00	29.00	29.00	29.00	29.00	29.00	28.50
1930	33.80	33.00	33.00	33.00	32.20	31.25	31.00	31.00	31.00	31.00	31.00	30.50
1929	34.00	33.25	35.00	35.25	36.00	35.75	35.00	35.00	35.00	35.00	35.00	34.75
1928	34.00	34.00	33.70	34.00	34.00	33.50	32.25	32.20	33.00	33.00	33.60	34.00
1927	36.00	35.00	34.00	33.75	33.75	33.50	33.50	33.50	33.90	34.00	34.00	34.00
1926	36.50	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
1925	39.20	39.00	38.50	37.00	36.25	35.00	35.00	35.00	35.00	35.00	35.00	36.80
1924	42.50	42.50	42.50	42.10	40.60	40.00	39.20	38.00	37.50	37.20	37.00	37.00
1923	37.50	39.25	44.50	45.85	45.40	42.90	42.50	42.50	42.50	42.50	42.50	42.50
1922	30.00	29.00	29.40	31.50	35.00	35.00	35.00	35.00	39.50	39.85	38.80	36.50
1921	47.00	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
1920	53.40	65.00	70.00	70.00	75.00	70.00	70.00	70.00	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	42.00	45.00	48.00
1918	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00
1917	60.00	62.50	67.50	72.00	88.00	101.25	105.00	96.00	82.50	65.50	57.00	57.00
1916	33.75	34.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	59.00
1915	20.00	20.00	20.00	19.60	20.00	20.35	22.00	25.00	25.80	26.50	28.50	30.80
1914	21.00	22.00	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	28.70	29.40	29.50	29.50	28.40	27.50	27.50	27.10	25.60	23.80	21.75	21.00

Wire Rods, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$36.00	$36.00	$36.00	$37.20	$38.00	$38.00	$38.00	$38.00	$38.00	$38.00	$38.00	$38.00
1933	36.20	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	36.00
1932	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
1931	35.00	35.00	36.00	36.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
1930	40.00	40.00	38.00	38.00	36.40	36.00	36.00	36.00	36.00	36.00	36.00	35.50
1929	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	40.00	40.00
1928	41.50	43.50	44.00	44.00	44.00	44.00	42.00	42.00	42.00	42.00	42.00	42.00
1927	45.00	43.50	43.00	42.50	42.00	42.00	43.00	43.00	43.00	42.50	41.00	40.00
1926	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
1925	48.00	48.00	48.00	47.75	46.80	45.25	45.00	45.00	45.00	45.00	45.00	45.30
1924	51.00	51.00	51.00	51.00	48.40	48.00	48.00	46.00	45.75	45.00	45.50	48.00
1923	45.00	47.50	47.00	46.60	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1922	37.00	35.75	35.80	38.00	38.00	38.00	39.50	40.00	45.00	45.00	46.50	46.50
1921	57.00	57.00	52.00	50.00	48.00	47.00	42.25	42.00	40.80	40.00	38.00	38.00
1920	52.00	56.00	62.50	70.00	70.00	70.00	70.00	70.00	70.00	75.00	72.50	57.00
1919	57.00	57.00	55.75	52.00	52.00	52.00	52.00	52.00	52.00	52.00	56.00	62.00
1918	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.25	57.50	57.50	57.50
1917	73.75	75.00	75.00	83.75	88.00	92.50	95.00	96.00	90.00	73.50	57.00	57.00
1916	46.25	50.00	51.00	55.00	60.00	60.00	58.75	55.00	55.00	55.00	64.00	69.00
1915	25.00	25.00	25.00	25.00	25.00	25.00	25.60	26.75	28.50	30.00	34.50	39.00
1914	25.50	25.90	26.00	26.00	26.00	25.50	24.80	24.50	25.60	26.00	25.75	25.95
1913	30.00	30.00	30.00	30.00	30.00	29.50	28.60	27.60	27.50	26.80	26.00	25.70
1912	24.65	25.30	25.50	25.50	25.90	25.35	25.65	26.00	26.25	27.80	29.60	30.00

By-Product Foundry Coke

Per Net Ton

Birmingham, ovens

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$5.00	$5.00	$5.00	$5.40	$5.50	$5.70	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00
1933	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.40	4.50	4.75	4.85	4.85
1932	4.50	4.50	4.50	4.50	4.50	4.50	4.25	4.50	4.50	4.50	4.15	4.00
1931	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.75
1930	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1929	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1928	5.00	5.00	5.00	3.95	4.80	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1927	5.15	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.25	5.00
1926	5.60	5.50	5.50	5.15	5.15	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1925	.....	4.90	5.00	5.00	4.65	4.50	4.50	4.50	4.60	4.75	5.70	5.70

Chicago, ovens

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$8.50	$8.50	$8.50	$8.50	$8.50	$8.50	$8.50	$8.50	$8.50	$8.50	$8.50	$8.50
1933	7.00	7.00	7.00	7.00	7.00	7.15	7.50	7.50	8.00	8.00	8.00	8.00
1932	7.50	7.50	7.50	7.50	7.30	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1931	8.00	8.00	8.00	8.00	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
1930	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1929	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1928	9.00	9.00	9.00	9.00	9.00	8.50	8.00	8.00	8.00	8.00	8.00	8.00
1927	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.30	9.00
1926	10.50	10.50	10.50	9.95	9.75	9.75	9.75	9.75	9.75	9.75	9.75	10.25
1925	10.75	10.75	10.75	10.75	10.75	10.75	9.75	9.75	9.75	10.25	10.45	10.50
1924	12.50	12.50	12.50	12.50	12.50	12.50	11.45	10.75	10.75	10.75	10.75	10.75
1923	15.00	15.00	15.00	15.00	15.00	15.00	13.50	13.50	13.50	13.50	12.50	12.50
1922	11.25	11.25	11.25	11.25	11.25	11.25	11.25	12.60	13.50	13.50	14.70	15.00
1921	.....	.....	.....	.....	.....	.....	11.25	11.25	11.25	11.25	11.25	11.25

Newark, delivered

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$8.71	$8.71	$8.71	$8.71	$8.71	$8.71	$8.71	$8.71	$8.71	$8.71	$8.71	$8.71
1933	8.21	8.21	8.21	8.21	8.21	8.21	8.21	8.21	8.51	8.71	8.71	8.71
1932	8.76	8.76	8.76	8.76	8.23	8.21	8.21	8.21	8.21	8.21	8.21	8.21
1931	9.00	9.00	9.00	9.00	9.00	8.70	8.70	8.70	8.70	8.70	8.70	8.70
1930	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1929	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1928	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1927	9.84	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59	9.59
1926	11.01	11.01	11.01	9.59	9.59	9.59	9.59	9.59	9.59	9.59	10.59	10.59
1925	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.71	11.04	11.52
1924	10.91	10.91	10.91	10.81	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41
1923	12.84	12.84	12.84	12.84	12.34	11.84	11.34	11.34	11.34	11.41	10.91	10.91
1922	8.59	8.59	8.59	8.84	9.49	10.34	11.47	14.04	14.84	14.84	13.28	12.84
1921	.....	.....	.....	.....	.....	.....	8.84	8.84	8.84	8.84	8.84	8.84

St. Louis, delivered

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$9.25	$9.25	$9.25	$9.25	$9.25	$9.25	$9.25	$9.25	$9.25	$9.25	$9.25	$9.25
1933	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	8.15	8.50	8.75	9.00
1932	8.50	8.50	8.50	8.50	8.50	7.95	7.75	7.75	7.75	7.75	7.75	7.75
1931	9.00	9.00	9.00	9.00	9.00	8.60	8.50	8.50	8.50	8.50	8.50	8.50
1930	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1929	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1928	9.75	9.75	9.75	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
1927	10.50	10.50	10.50	*9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75
1926	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.25	10.50
1925	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.15	9.50	9.80	10.00	10.00
1924	12.50	12.50	12.50	12.00	12.00	10.60	9.20	9.00	9.00	9.00	9.00	9.00
1923	14.00	14.25	14.20	14.00	14.00	14.00	14.00	13.00	13.00	13.00	13.00	13.00
1922	9.50	9.50	9.30	9.00	9.00	9.00	9.00	11.40	13.00	14.00	14.00	14.00
1921	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.50

*Granite City previous to April, 1927.

New England, delivered

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$10.50	$10.50	$10.50	$10.50	$10.50	$10.50	$10.50	$10.50	$10.50	$10.50	$10.87	$11.00
1933	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.30	10.50	10.50	10.50
1932	10.50	10.50	10.50	10.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
1931	11.00	11.00	11.00	11.00	11.00	10.50	10.50	10.50	10.50	10.50	10.50	10.50
1930	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1929	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1928	11.50	11.50	11.50	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
1927	13.50	12.65	12.50	12.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
1926	13.00	13.00	13.00	12.50	12.50	12.00	12.00	12.00	12.00	12.00	13.00	13.50
1925	11.50	12.00	12.00	12.00	12.00	11.50	11.50	11.65	12.00	12.00	12.90	13.00
1924	12.50	12.50	12.50	12.00	12.00	11.30	*11.80	11.50	11.50	11.50	11.50	11.50
1923	16.00	16.00	16.00	16.00	16.00	15.50	13.50	13.50	13.50	13.00	12.50	12.50
1922	10.40	10.25	10.15	10.15	10.15	10.15	14.00	16.30	16.50	16.50	16.20	16.00
1921	.....	.....	.....	.....	.....	.....	.....	.....	10.66	10.66	10.66	10.66

*Prior to July, 1924, Boston delivered.

Beehive Coke

Per Net Ton

Foundry, Spot, Connellsville

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$4.25	$4.25	$4.25	$4.55	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60	$4.60
1933	2.50	2.50	2.25	2.25	2.25	2.40	2.80	3.10	3.15	3.85	4.25	4.25
1932	3.25	3.25	3.25	3.25	3.15	3.00	3.00	2.90	2.75	2.75	2.65	2.50
1931	3.30	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1930	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1929	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.55	3.50
1928	3.75	3.75	3.75	3.65	3.55	3.50	3.50	3.75	3.75	3.75	3.75	3.75
1927	4.25	3.85	4.15	4.05	3.80	3.90	4.00	4.00	4.00	3.75	3.75	3.65
1926	6.40	6.50	4.45	4.10	3.85	3.75	3.70	3.60	4.15	4.65	5.85	4.75
1925	5.10	4.30	3.85	3.85	3.70	3.75	3.75	3.80	4.20	5.95	6.85	5.30
1924	4.35	4.80	4.85	4.60	4.30	4.15	4.05	4.00	4.00	4.00	4.05	4.25
1923	9.00	8.60	8.15	7.80	6.10	5.50	5.15	5.20	5.70	4.80	4.85	5.15
1922	3.85	3.80	4.05	4.95	6.50	7.20	11.40	14.30	12.75	12.10	8.40	7.50
1921	6.50	6.30	6.05	5.90	4.85	4.50	4.45	4.90	4.30	4.50	4.30	4.15
1920	7.00	7.00	7.00	11.60	12.50	15.00	16.00	18.25	17.90	16.85	9.40	7.25
1919	7.05	5.15	4.80	4.55	4.35	4.70	4.80	5.20	5.90	5.60	6.95	7.15
1918	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1917	10.40	10.90	11.30	9.65	9.65	11.20	15.00	12.70	13.35	7.00	7.00	7.00
1916	3.75	3.75	3.60	3.85	3.10	3.00	3.00	3.05	3.25	4.35	8.60	9.25
1915	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.05	2.25	2.30	2.95	3.15
1914	2.50	2.40	2.40	2.40	2.40	2.35	2.30	2.25	2.25	2.20	2.10	2.00
1913	4.45	3.70	3.50	3.05	2.90	2.85	2.85	2.85	2.85	2.75	2.50	2.50
1912	2.05	2.20	2.65	2.75	2.60	2.55	2.45	2.60	2.65	3.35	4.40	4.50
1911	1.95	1.95	2.00	2.00	1.90	1.75	1.80	1.85	1.85	1.85	1.90	1.90
1910	3.00	2.90	2.80	2.55	2.30	2.15	2.10	2.15	2.10	2.05	2.00	2.00
1909	1.70	1.60	1.55	1.50	1.45	1.50	1.50	1.65	2.30	2.75	2.80	2.75
1908	1.80	1.75	1.70	1.65	1.65	1.65	1.65	1.65	1.65	1.70	1.75	1.80
1907	3.75	3.55	3.00	2.70	2.15	2.05	2.40	2.60	2.80	2.90	2.40	2.00
1906	3.00	2.40	2.35	2.60	2.55	2.40	2.55	2.70	2.75	2.85	3.20	3.60
1905	2.80	2.50	2.50	2.00	1.90	1.85	1.80	1.85	2.00	2.70	3.00	2.85
1904	1.45	1.50	1.55	1.50	1.45	1.40	1.40	1.40	1.40	1.45	1.85	2.15
1903	4.50	4.50	4.00	3.75	3.50	3.00	2.50	2.00	2.00	1.90	1.90	1.75
1902	2.25	2.25	2.50	2.50	2.50	2.50	2.50	3.25	4.00	5.00	5.00	5.00
1901	1.75	1.75	2.00	2.00	2.00	1.85	1.75	1.75	1.75	2.00	2.00	2.00
1900	3.00	3.50	4.00	3.75	3.00	2.58	2.00	1.75	1.75	1.75	1.75	1.75

Furnace, Spot, Connellsville

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$3.60	$3.50	$3.35	$3.30	$3.45	$3.60	$3.60	$3.60	$3.60	$3.60	$3.60	$3.60
1933	1.75	1.75	1.75	1.75	1.75	1.80	2.40	2.75	2.50	3.25	3.75	3.75
1932	2.25	2.25	2.25	2.25	2.15	2.00	2.00	2.00	2.00	2.00	1.80	1.80
1931	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.35	2.30
1930	3.55	2.60	2.60	2.60	2.55	2.50	2.50	2.50	2.60	2.60	2.55	2.50
1929	2.75	2.90	2.95	2.75	2.75	2.75	2.75	2.75	2.65	2.65	2.65	2.65
1928	2.70	2.65	2.60	2.60	2.55	2.60	2.60	2.75	2.75	2.80	2.75	2.75
1927	3.35	3.35	3.30	3.20	2.80	2.85	2.90	3.00	2.85	2.85	2.80	2.65
1926	6.90	7.45	3.15	3.05	2.85	2.70	2.65	2.85	3.25	3.65	4.75	3.65
1925	4.10	3.65	3.35	3.10	3.10	2.80	2.80	3.10	3.45	5.65	6.35	3.90
1924	3.80	4.00	4.05	3.55	3.25	3.15	2.85	3.00	3.00	3.00	3.00	3.35
1923	8.25	7.20	7.15	6.25	5.10	4.65	4.35	4.45	4.55	3.85	3.80	4.20
1922	2.75	2.95	3.25	4.30	6.00	6.60	10.65	13.20	11.00	10.60	7.10	6.25
1921	5.15	4.85	4.55	3.60	3.25	3.15	2.75	2.85	3.15	3.25	3.15	2.95
1920	6.00	6.00	6.00	11.20	12.00	14.50	15.20	17.75	16.90	15.15	8.40	6.25
1919	5.85	4.40	4.30	4.05	3.95	4.10	4.25	4.60	4.95	4.35	5.75	6.20
1918	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1917	9.05	11.20	9.40	7.60	8.35	11.40	12.10	13.70	12.10	6.00	6.00	6.00
1916	2.50	3.00	3.00	2.25	2.25	2.55	2.70	2.75	2.95	5.30	7.05	8.25
1915	1.60	1.55	1.55	1.50	1.55	1.55	1.70	1.50	1.60	1.70	2.10	2.10
1914	1.80	1.80	1.95	1.90	1.75	1.75	1.75	1.75	1.65	1.65	1.60	1.60

Iron and Steel Scrap

Per Gross Ton Delivered

Heavy Melting Steel, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$13.65	$13.90	$14.30	$14.15	$12.80	$11.90	$12.00	$11.45	$10.75	$10.50	$11.15	$13.00
1933	8.35	8.25	8.75	9.90	11.65	11.65	12.70	13.75	13.00	12.45	11.65	11.50
1932	10.25	10.25	10.25	10.20	9.75	9.00	8.35	8.55	9.50	9.50	9.15	8.75
1931	13.00	12.75	12.90	12.50	11.25	10.30	10.50	10.70	10.80	10.45	10.25	10.25
1930	16.55	16.90	16.60	16.05	15.40	15.10	14.90	15.20	15.70	14.80	12.85	12.75
1929	19.00	18.60	18.50	18.60	17.85	18.30	18.45	18.90	18.45	17.30	16.30	15.10
1928	15.35	15.05	14.75	14.85	15.00	14.70	14.10	15.00	16.55	17.35	17.35	17.50
1927	17.00	16.10	16.40	16.50	15.50	15.10	14.95	15.00	15.00	14.50	14.50	14.60
1926	18.75	17.60	17.70	16.90	16.00	15.85	16.70	17.75	17.75	17.00	17.00	17.00
1925	22.10	19.00	18.25	17.00	16.60	17.10	17.20	19.25	19.00	18.40	19.50	19.00
1924	21.10	21.60	19.75	16.60	15.40	16.25	17.30	17.75	18.60	18.20	19.85	21.00
1923	21.65	23.40	26.10	25.85	22.50	20.50	18.25	17.50	18.00	16.10	15.70	18.50
1922	14.50	13.95	14.95	16.50	17.00	17.40	16.50	17.10	19.50	21.35	20.30	20.00
1921	15.00	15.00	15.00	13.00	13.60	13.10	12.00	12.60	13.20	14.00	14.25	14.25
1920	26.50	28.15	28.00	26.40	25.50	25.30	25.70	27.75	28.60	28.00	24.00	17.20
1919	20.80	17.00	14.60	15.75	15.55	17.25	19.90	21.25	20.50	20.00	21.90	24.65
1918	30.00	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1917	23.25	21.90	23.40	28.15	28.40	40.00	40.25	36.60	35.50	31.30	29.60	30.00
1916	17.50	17.35	17.95	18.10	17.10	16.25	16.25	16.00	16.10	17.80	20.55	26.75
1915	11.55	11.60	12.00	11.90	11.75	11.75	11.75	13.38	14.25	14.00	15.30	17.40
1914	11.30	12.15	12.40	12.25	12.00	12.00	12.00	11.65	11.65	11.40	10.40	10.45
1913	15.15	14.90	14.40	14.40	14.15	13.50	12.75	12.65	12.65	12.65	11.75	11.20
1912	12.50	12.65	12.40	13.00	13.40	13.40	13.65	13.55	13.90	14.40	15.30	15.00
1911	13.50	14.30	14.40	13.50	12.75	13.15	12.90	13.40	13.15	12.25	12.15	12.50
1910	17.90	17.65	17.00	17.00	16.00	15.25	14.50	14.25	14.25	14.40	14.15	13.75
1909	16.50	16.00	14.75	14.15	14.95	15.50	15.75	16.00	16.75	17.90	18.15	17.95
1908	13.25	13.25	13.50	12.75	12.75	13.00	13.25	14.75	14.75	14.50	14.75	16.25
1907	19.25	18.75	18.25	18.25	18.15	18.65	18.50	18.25	17.75	17.50	15.45	13.75
1906	17.75	16.65	15.90	14.65	15.25	15.00	15.75	16.00	16.90	16.75	17.25	19.75
1905	16.75	16.15	16.50	16.50	15.40	14.50	14.25	14.15	15.40	16.20	17.15	18.25
1904	12.65	13.25	13.75	14.15	13.05	11.50	10.75	11.15	11.75	12.00	13.65	14.90
1903	22.25	21.75	21.25	22.15	21.65	20.50	20.25	18.75	18.25	16.00	14.50	11.50
1902	17.25	17.45	18.55	19.40	20.25	21.40	22.25	21.25	21.25	21.65	21.15	22.25

Heavy Melting Steel, Detroit (dealers)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$8.75	$9.50	$10.15	$9.70	$8.90	$8.00	$8.00	$7.80	$7.75	$7.50	$8.00	$8.80
1933	4.50	4.50	4.50	5.40	7.75	7.80	8.95	9.50	8.55	7.35	7.00	7.25
1932	5.55	5.75	5.75	5.70	5.10	4.75	3.90	4.25	5.55	5.75	5.30	4.60
1931	9.50	9.50	9.15	8.65	8.15	7.40	7.55	7.30	6.80	6.15	6.00	5.80
1930	12.25	12.00	11.85	11.70	11.30	11.00	10.85	10.95	11.15	10.95	9.95	9.55
1929	14.20	14.35	14.05	14.25	13.90	13.50	13.75	14.35	14.20	13.40	12.40	12.50
1928	11.44	11.25	11.05	10.75	11.00	10.88	10.38	10.50	11.69	12.50	13.30	13.50
1927	12.50	12.50	12.70	12.88	11.88	11.50	11.56	11.75	11.70	11.50	11.38	11.25
1926	14.75	14.75	14.75	13.35	12.50	12.00	12.80	13.50	12.94	12.75	11.94	12.20

Heavy Melting Steel, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$10.44	$10.87	$12.00	$11.75	$11.13	$9.75	$9.55	$9.25	$8.65	$8.75	$9.00	$10.15
1933	5.25	5.25	5.25	6.55	8.70	8.80	10.45	10.40	9.95	9.35	8.35	8.75
1932	7.25	6.80	6.75	6.55	6.20	5.60	4.50	5.40	5.75	6.00	5.75	5.50
1931	10.00	9.85	9.75	9.60	8.65	8.50	8.50	8.25	7.95	7.75	7.65	7.50
1930	12.65	13.25	13.20	13.00	12.55	12.05	12.00	12.00	12.25	11.55	10.20	10.00
1929	16.50	16.00	15.55	15.95	15.45	14.95	14.75	15.05	15.05	14.45	13.05	12.50
1928	12.25	12.55	12.75	12.75	12.95	12.60	12.30	12.65	12.90	13.75	14.50	14.50
1927	13.20	13.10	13.05	13.10	12.35	12.00	12.10	12.35	12.20	11.75	11.50	11.95
1926	14.95	13.75	14.00	13.20	12.25	12.65	14.20	14.00	14.10	13.05	13.00	12.90
1925	19.45	17.55	16.70	15.00	14.90	15.90	15.35	16.05	16.45	16.25	16.40	15.80
1924	17.40	18.00	16.70	14.65	13.75	13.55	14.75	15.40	16.40	16.25	17.05	18.50
1923	18.70	19.75	23.15	22.40	19.75	17.75	17.10	16.25	16.55	14.50	13.80	16.00
1922	11.20	11.15	12.05	13.55	14.65	14.45	15.15	15.85	18.15	18.50	17.40	16.75
1921	15.25	15.25	12.55	11.25	11.50	11.20	10.55	10.70	11.30	12.55	12.40	11.00
1920	24.25	25.05	24.20	23.95	23.15	22.40	23.70	24.15	24.20	21.40	18.50	16.75
1919	19.20	14.90	15.25	16.40	15.40	16.75	19.40	20.75	19.00	18.80	20.65	21.25
1918	29.70	30.00	30.00	28.65	28.90	29.00	29.00	29.00	29.00	29.00	29.00	26.50
1917	20.25	21.65	23.00	26.65	28.70	37.00	35.50	33.10	32.65	27.00	28.50	28.90
1916	15.50	15.25	16.20	16.75	16.50	15.35	14.15	14.90	15.50	16.50	19.35	23.35
1915	8.90	9.45	9.75	9.30	9.25	9.40	10.15	11.50	12.00	11.55	13.15	15.40
1914	9.20	10.00	9.80	9.50	9.95	9.75	9.50	9.50	9.40	9.00	8.25	8.25
1913	12.75	12.50	12.50	12.50	12.00	12.00	12.00	12.00	12.00	12.00	9.00	9.00
1912	11.00	10.75	11.25	12.25	12.25	12.25	11.75	12.50	13.00	14.00	13.75	13.75
1911	11.50	12.00	12.00	11.50	10.25	10.25	10.25	10.75	10.50	10.00	9.75	9.75
1910	16.00	15.50	14.50	14.50	13.00	13.00	12.50	12.25	12.25	12.25	12.00	12.00
1909	14.00	13.40	12.15	12.90	13.50	14.15	14.05	14.95	15.80	16.30	15.75	15.50

Heavy Melting Steel, Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$11.63	$11.73	$11.70	$11.50	$11.00	$10.40	$10.25	$9.85	$9.60	$9.50	$9.95	$10.85
1933	6.50	6.50	6.50	6.90	9.00	9.50	10.55	12.00	10.70	10.20	9.55	10.50
1932	7.50	7.35	7.35	7.20	6.50	6.25	6.25	6.40	7.25	7.25	7.25	6.50
1931	10.50	10.50	10.50	10.00	9.50	8.75	8.25	8.55	8.75	8.20	7.95	7.50
1930	14.50	14.50	14.95	13.95	13.40	13.25	12.50	12.65	13.00	12.00	11.50	11.00
1929	16.50	16.30	16.25	17.00	16.25	16.25	16.50	16.75	16.37	15.80	15.15	14.50
1928	14.00	14.00	13.75	13.75	13.75	13.15	12.75	12.75	14.65	16.00	15.90	15.50
1927	15.60	15.00	14.75	14.75	14.45	14.25	13.75	13.75	14.00	14.00	14.00	14.00
1926	17.35	16.35	16.20	15.90	15.25	15.25	15.50	16.75	16.85	16.65	15.95	15.50
1925	20.00	17.85	16.25	15.50	15.00	15.65	16.00	16.75	17.25	17.00	17.60	17.70
1924	18.05	18.95	17.00	15.25	14.20	15.00	15.00	16.50	15.90	16.50	18.05	19.00
1923	19.70	21.20	24.85	23.50	20.40	18.65	17.25	16.00	16.85	15.50	15.50	17.00
1922	11.75	12.25	13.15	14.35	15.15	15.30	15.00	15.25	17.10	18.00	16.70	16.00
1921	15.00	14.50	13.40	11.75	11.80	11.85	11.25	11.25	11.75	12.25	12.60	12.00
1920	24.25	25.75	25.55	24.30	23.60	22.40	22.00	24.10	26.40	23.80	20.30	16.90
1919	19.00	15.25	14.25	15.85	15.30	16.15	18.85	19.60	19.00	19.55	20.80	23.90
1918	29.80	30.00	29.50	28.30	28.50	28.50	28.50	28.50	28.50	28.50	28.00	25.00
1917	21.75	20.25	23.50	25.00	26.00	32.60	37.00	32.80	30.75	26.00	26.80	28.00
1916	15.50	14.95	16.15	16.80	16.35	15.35	13.95	15.40	16.65	17.50	21.25	24.00
1915	10.00	10.50	11.00	11.25	11.50	11.50	12.00	13.50	14.50	15.00	14.50	16.00
1914	10.50	11.25	11.50	11.00	10.75	10.75	10.50	10.75	10.75	9.75	9.50	9.50
1913	14.50	13.50	13.50	13.75	12.50	12.00	11.50	11.75	12.00	11.00	10.25	10.00
1912	12.25	12.00	12.25	13.00	13.75	13.50	13.75	14.25	14.75	15.50	15.25	15.00
1911	12.75	14.25	14.25	13.75	13.25	13.00	13.00	13.25	12.75	12.00	12.25	12.50
1910	17.00	16.50	16.50	15.50	14.50	14.50	14.00	13.75	14.00	13.50	12.75	12.50
1909	17.00	15.50	13.75	13.50	14.50	15.50	16.00	17.00	17.50	18.00	18.00	17.25

No. 1 Railroad Wrought, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$8.87	$9.12	$9.63	$9.75	$9.30	$8.50	$8.35	$8.00	$7.60	$7.25	$7.25	$9.15
1933	5.00	5.00	5.00	5.50	8.10	8.10	10.20	10.35	9.25	9.10	8.10	7.50
1932	7.25	6.85	6.25	5.85	5.25	5.00	4.60	4.50	5.60	5.60	5.60	5.00
1931	9.50	9.25	9.00	8.80	8.40	8.25	8.25	8.25	8.00	8.00	8.00	7.45
1930	13.40	13.70	13.50	13.30	12.70	11.50	11.25	11.25	11.25	10.95	10.20	10.00
1929	14.75	15.75	16.00	16.65	16.40	15.40	14.85	15.40	15.70	14.85	13.85	13.25
1928	12.65	12.40	12.45	12.45	13.05	12.70	12.30	12.40	12.90	13.50	14.25	14.50
1927	14.20	13.95	13.50	13.50	12.75	12.10	12.35	13.45	12.70	11.40	11.25	11.25
1926	15.00	14.40	14.50	14.05	12.55	12.65	14.80	14.75	14.56	14.50	13.75	13.75
1925	19.15	17.75	16.65	14.60	14.65	15.90	15.90	17.45	17.05	16.30	17.70	15.90
1924	17.50	17.50	16.05	14.80	13.60	13.25	14.80	15.75	16.70	15.95	17.10	18.75
1923	19.40	20.50	23.25	22.75	19.95	16.95	16.60	17.05	18.25	15.30	14.10	16.00
1922	11.80	11.65	12.25	13.25	14.35	14.20	15.20	16.35	19.95	20.40	18.10	17.00
1921	15.65	15.90	13.50	12.05	11.90	10.80	10.25	11.75	13.05	14.65	13.70	12.10
1920	29.00	30.75	30.70	30.70	29.50	28.00	28.10	18.50	27.50	22.50	19.55	16.60
1919	23.30	16.65	17.65	18.50	17.05	18.70	21.20	23.25	21.25	22.00	26.50	27.00
1918	35.00	35.00	35.00*	35.00	35.00	35.00	34.50	33.50	33.50	33.50	33.50	29.00
1917	23.75	24.00	25.75	29.80	32.60	41.75	39.15	35.40	36.25	31.90	30.60	31.50
1916	15.50	14.95	16.15	16.80	16.35	15.35	13.95	15.40	16.65	17.50	21.25	26.00
1915	8.80	8.90	9.00	8.55	8.75	8.75	8.90	10.10	10.75	10.70	12.75	14.90

*Quotations net tons to March 31, 1918, gross tons thereafter

No. 1 Railroad Wrought, Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$12.75	$12.75	$12.75	$12.25	$11.55	$10.00	$10.20	$9.80	$9.50	$10.25	$10.70	$11.65
1933	6.50	6.50	6.75	7.35	10.25	10.25	11.60	13.00	11.60	10.75	10.15	11.00
1932	9.35	9.00	9.00	7.95	7.75	6.70	6.25	6.25	7.25	7.25	7.25	6.50
1931	13.25	12.50	11.00	11.00	11.00	10.50	10.00	9.75	9.75	9.50	9.50	9.50
1930	15.25	15.25	15.25	15.75	15.40	15.25	14.25	14.25	14.25	14.25	13.50	13.50
1929	15.50	16.25	16.25	16.25	16.25	16.25	16.25	16.25	16.13	16.00	16.25	15.25
1928	15.25	15.25	15.25	15.25	15.25	15.25	15.25	14.80	15.10	15.50	15.50	15.50
1927	17.00	17.00	17.65	16.75	16.75	16.75	16.25	15.95	15.75	15.75	15.75	15.75
1926	18.35	18.00	18.00	17.75	17.35	17.00	17.00	17.25	17.00	17.00	17.00	17.00
1925	21.50	20.50	19.50	18.40	17.60	18.20	18.25	18.25	18.25	18.25	18.75	18.75
1924	20.10	21.35	19.00	18.40	17.75	17.75	18.05	18.50	18.75	18.75	18.95	19.00
1923	22.25	24.10	27.60	27.00	24.40	22.75	18.85	17.50	19.00	18.00	17.75	19.00
1922	15.00	15.00	15.20	15.63	16.80	17.25	18.00	18.00	20.75	22.00	21.00	18.95
1921	20.00	20.00	18.20	15.50	15.00	15.00	14.25	14.00	14.20	15.40	16.00	15.75
1920	32.90	36.10	36.50	35.25	34.00	33.50	33.50	33.25	34.40	29.85	25.75	20.10
1919	29.80	25.00	24.00	21.50	21.90	22.50	24.70	27.25	27.00	27.00	27.85	30.75
1918	35.00	35.00	35.00*	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
1917	27.00	26.75	30.00	36.00	40.80	47.85	54.05	46.20	44.50	41.80	35.35	35.00
1916	22.25	22.50	23.00	23.00	22.50	20.00	19.75	20.00	21.00	22.00	20.55	26.75
1915	11.75	12.00	12.50	12.50	12.50	12.75	13.50	15.00	16.00	16.00	17.00	20.00
1914	12.90	14.75	15.25	13.15	13.15	12.65	12.65	12.00	12.50	11.50	11.50	11.50
1913	16.25	16.25	15.25	16.25	15.50	14.75	14.70	14.25	14.25	13.75	13.75	13.35
1912	15.75	14.75	14.50	14.25	16.25	16.00	15.75	15.25	16.65	16.75	17.75	16.75
1911	16.25	16.25	17.75	16.75	15.50	15.25	15.25	15.75	15.75	14.50	14.00	14.45
1910	18.75	19.00	18.75	19.25	18.25	16.75	16.25	16.25	16.15	16.75	16.25	16.25
1909	20.25	19.25	16.25	15.25	16.25	18.60	17.75	18.75	19.75	20.75	21.25	20.25
1908	14.25	14.25	15.25	14.75	15.50	15.75	16.00	16.50	18.25	18.25	18.50	19.75
1907	23.25	22.25	21.00	20.50	20.00	20.75	20.25	19.75	18.00	18.00	17.25	14.75
1906	22.75	21.00	19.75	20.25	20.75	18.25	17.50	18.25	20.75	22.25	22.25	23.25
1905	19.75	21.75	22.00	22.75	21.75	18.75	17.00	17.50	19.50	21.75	19.85	23.25
1904	14.65	16.00	16.50	18.25	17.75	14.00	12.75	13.25	14.40	15.25	16.25	19.00

*Quotations net tons to March 31, 1918, gross tons thereafter.

No. 1 Cast, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$12.50	$12.65	$13.10	$12.85	$12.40	$13.00	$13.00	$12.40	$12.00	$12.00	$12.20	$13.50
1933	8.55	9.00	9.00	9.00	10.10	10.40	10.65	10.60	10.60	11.20	11.00	11.00
1932	10.00	9.80	9.50	9.50	9.20	9.00	8.60	8.50	9.50	9.50	9.25	9.00
1931	12.50	12.50	12.50	12.20	11.50	10.85	10.00	10.00	10.00	10.00	10.00	10.00
1930	14.75	14.50	14.50	15.00	14.50	14.00	14.00	14.00	14.00	13.40	12.40	12.50
1929	15.30	14.50	15.20	15.45	15.00	15.00	15.00	15.00	15.00	15.00	14.90	14.50
1928	14.50	14.50	14.50	14.75	14.60	14.00	14.00	14.05	14.25	14.55	15.10	14.70
1927	16.00	15.60	15.60	16.00	15.75	15.10	15.00	15.00	15.00	14.70	14.50	14.50
1926	17.40	16.86	17.00	17.00	16.25	15.85	15.60	16.85	16.40	16.10	16.00	16.00
1925	19.50	18.85	18.35	17.80	17.00	17.00	17.00	17.10	17.50	17.40	17.75	17.50
1924	21.30	20.85	19.60	18.35	17.50	17.75	17.70	18.00	18.35	17.70	18.25	18.50
1923	22.65	24.50	27.70	27.75	25.60	23.75	21.50	21.20	21.50	19.35	18.50	20.00
1922	16.00	16.00	16.40	17.25	18.50	18.70	19.15	19.00	21.75	23.35	23.30	22.50
1921	24.50	22.00	21.00	18.25	17.50	16.00	15.00	14.85	16.30	17.50	17.10	16.25
1920	32.50	41.50	41.00	39.60	39.00	40.00	38.50	41.50	42.20	40.75	38.00	27.50
1919	25.60	21.00	21.00	21.75	21.00	21.00	21.00	24.00	24.50	25.00	28.75	30.50
1918	28.00	28.00	28.00	34.00	32.50	32.50	32.50	32.50	32.50	32.50	32.40	32.00
1917	20.00	19.75	21.50	23.35	24.60	33.25	34.75	35.00	32.50	28.00	28.50	28.50

No. 1 Cast, Eastern Pennsylvania

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$11.50	$11.65	$12.30	$12.50	$12.15	$12.00	$11.25	$11.00	$11.00	$11.00	$11.00	$11.25
1933	9.00	9.00	9.00	9.10	10.25	10.35	11.20	11.75	12.40	12.00	11.95	12.00
1932	11.20	10.00	10.00	9.50	9.25	9.00	9.00	9.25	9.25	9.00	9.00	9.00
1931	12.80	13.00	13.00	13.00	12.75	12.50	12.50	12.50	12.50	12.50	11.70	11.50
1930	16.00	15.75	15.75	15.50	15.00	14.75	13.50	13.50	13.50	13.50	13.50	12.50
1929	16.75	16.75	16.50	16.50	16.50	16.50	16.50	16.50	16.25	16.25	16.00	16.00
1928	16.75	16.75	16.75	16.25	16.25	16.00	16.00	15.75	16.20	17.00	16.50	16.50
1927	17.75	17.50	17.50	17.25	17.25	16.75	16.35	16.25	16.25	16.25	16.75	16.75
1926	18.35	18.25	18.25	18.25	18.00	17.75	17.80	18.25	18.15	17.75	17.75	17.75
1925	20.75	19.35	18.50	18.20	17.10	17.75	17.75	17.75	18.65	18.75	18.75	18.75
1924	20.75	20.35	19.25	18.35	17.10	17.90	17.80	18.00	18.40	17.95	18.25	19.50
1923	23.30	24.75	28.00	26.85	24.00	22.75	21.00	20.00	20.35	19.70	19.50	20.50
1922	16.75	16.50	17.00	17.40	17.90	18.50	18.00	18.00	20.65	23.00	21.90	20.50
1921	24.15	23.35	20.50	18.15	17.90	17.50	17.50	16.50	16.50	17.50	18.00	17.50
1920	36.50	38.55	40.00	38.00	38.00	37.00	37.20	38.75	39.80	38.00	34.75	28.90
1919	28.15	25.00	22.50	22.50	21.50	22.00	23.50	24.65	25.00	25.15	28.00	31.75
1918	33.50	34.50	33.90	32.75	33.00	33.75	34.00	34.00	34.00	34.00	34.00	34.00
1917	20.75	20.15	22.50	26.75	30.00	34.75	38.35	34.10	32.90	30.00	30.50	32.00
1916	17.50	17.50	17.75	18.00	17.75	16.50	16.00	16.00	16.25	16.50	18.50	22.00
1915	12.00	12.00	12.50	12.50	12.00	12.25	12.25	13.50	14.50	14.50	15.00	15.60

No. 1 Cast, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$8.90	$9.00	$9.05	$9.05	$9.00	$8.50	$8.50	$8.50	$8.15	$8.40	$8.75	$9.55
1933	5.95	6.00	6.20	7.15	8.75	8.75	9.90	10.50	9.85	9.25	8.00	8.25
1932	8.90	8.90	8.40	7.85	7.00	6.40	6.15	6.45	7.30	7.30	6.85	6.70
1931	10.65	10.65	10.65	10.25	9.80	9.80	9.80	9.80	9.80	9.80	9.00	8.95
1930	15.10	15.25	15.70	15.60	14.80	14.25	13.45	13.45	13.45	12.90	10.95	10.65
1929	17.70	17.90	17.90	17.90	17.25	16.25	16.25	16.25	16.80	15.65	15.35	15.10
1928	15.75	15.75	15.65	15.65	15.90	15.95	15.95	15.95	16.30	16.55	16.90	17.35
1927	18.90	18.90	18.50	18.10	17.35	16.65	16.55	16.80	16.80	16.25	15.85	15.70
1926	19.40	18.75	18.75	18.65	18.05	18.15	19.55	19.00	18.95	17.90	18.35	18.50
1925	22.10	20.15	19.70	18.85	19.00	19.50	19.75	20.30	20.15	19.40	20.90	20.50
1924	22.10	22.25	20.80	20.00	19.00	17.75	18.60	19.00	20.25	19.20	19.25	20.75
1923	24.30	25.75	28.50	27.55	24.20	23.25	23.25	21.20	21.50	20.40	20.55	21.50
1922	14.00	14.50	15.10	16.15	17.40	17.30	17.65	19.70	23.80	24.00	22.90	22.00
1921	20.35	21.15	18.10	15.25	15.85	14.90	13.75	13.95	14.50	15.25	15.50	14.00
1920	42.50	43.25	42.20	44.10	42.50	41.75	41.20	42.00	39.30	32.75	27.65	22.10
1919	26.25	22.05	23.10	23.50	22.35	23.40	20.65	27.75	26.75	28.15	31.10	35.35
1918	30.00	30.00	33.00	32.45	30.75	31.00	31.80	33.40	34.00	34.00	32.75	29.00

Cast Borings, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$7.30	$8.15	$8.70	$8.50	$8.25	$7.75	$7.25	$7.05	$6.25	$5.50	$5.90	$6.00
1933	5.70	5.70	5.55	5.70	6.90	7.65	9.05	9.80	9.05	8.30	7.60	7.50
1932	6.75	6.50	6.75	6.65	6.40	5.50	4.75	5.15	5.95	6.25	6.50	5.90
1931	7.70	7.70	7.65	7.60	7.50	7.75	7.05	7.50	7.45	7.50	7.10	6.80
1930	11.10	12.00	11.15	10.75	10.50	9.88	8.50	8.50	8.90	8.40	7.75	7.15
1929	12.55	12.25	11.50	12.15	11.55	11.85	12.10	12.50	12.40	11.80	11.15	10.75
1928	11.50	11.00	10.70	10.60	10.70	10.40	9.80	10.50	12.00	12.40	12.00	12.50
1927	12.50	12.00	12.10	12.38	11.13	10.50	10.50	11.50	11.30	11.00	11.00	11.60
1926	14.75	14.25	13.25	12.60	11.75	11.85	12.20	12.75	13.00	12.60	12.50	12.00
1925	17.20	15.60	14.50	13.60	12.85	13.40	13.50	14.50	14.85	14.10	15.10	14.80
1924	16.50	16.50	15.35	13.65	12.00	13.85	13.75	14.20	14.75	15.20	16.25	17.00
1923	18.50	19.75	21.80	21.10	21.60	17.50	15.50	15.00	16.00	13.40	12.40	14.00
1922	10.40	11.25	11.85	13.00	14.15	14.80	15.75	15.75	17.30	18.15	17.75	17.50
1921	12.50	12.35	11.60	9.70	9.50	9.00	7.60	8.00	9.05	11.60	10.65	9.55
1920	19.35	21.70	20.35	19.85	19.25	18.35	18.25	19.55	20.50	19.35	17.00	14.50
1919	14.00	11.80	10.95	12.60	11.30	11.65	13.90	16.10	15.75	15.75	17.95	18.35
1918	20.00	20.00	20.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	18.00
1917	12.35	12.25	13.20	14.70	15.45	21.10	23.90	22.00	23.55	20.76	20.00	20.00
1916	11.35	11.40	11.40	11.30	10.30	9.90	8.65	8.00	8.50	9.15	9.85	13.35
1915	8.25	8.15	8.40	8.40	8.40	8.65	8.65	9.00	9.25	9.75	10.00	10.20
1914	7.90	8.40	9.25	8.40	8.40	7.90	8.15	8.50	8.50	8.25	8.25	8.25
1913	10.40	10.40	10.40	10.40	10.40	9.25	8.40	8.15	8.15	8.40	7.75	7.45
1912	9.65	9.40	9.15	9.65	10.15	10.15	10.25	10.15	9.90	9.90	10.50	10.40
1911	8.65	8.65	9.50	8.75	8.50	8.90	8.90	9.25	9.40	8.50	8.25	8.35
1910	11.00	10.75	9.75	9.75	9.25	8.75	8.00	8.25	8.40	8.40	8.50	8.65
1909	10.75	9.75	8.25	7.75	7.25	9.65	9.75	9.50	10.65	11.15	11.25	11.00
1908	6.50	7.50	8.00	8.00	7.50	7.75	7.75	8.75	8.75	8.75	9.75	11.00
1907	12.40	12.65	13.15	13.65	13.50	13.75	13.75	13.25	13.25	13.00	9.95	6.50
1906	10.90	10.15	9.65	8.15	8.90	8.75	8.75	9.00	9.75	10.25	10.75	12.25
1905	10.75	11.25	11.15	10.90	10.15	10.00	9.15	8.40	8.90	9.75	10.50	10.90
1904	6.00	5.75	5.40	6.15	7.15	5.65	5.75	5.25	6.25	6.25	7.40	8.75
1903	11.25	11.50	11.65	11.25	11.25	.....	.....	9.00	9.00	7.00	.....	5.25
1902	8.55	9.15	9.65	10.75	11.75	12.00	11.65	10.75	14.40	15.85	11.65	11.50

Low Phosphorus Scrap, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$16.00	$16.25	$16.90	$16.90	$15.55	$14.45	$14.50	$14.00	$13.50	$13.40	$13.75	$15.00
1933	10.00	10.25	10.70	11.10	13.55	13.70	14.55	16.00	15.10	14.30	13.50	13.50
1932	13.90	13.00	13.15	13.85	13.00	12.00	10.60	10.50	10.50	10.60	10.75	10.50
1931	17.20	17.50	17.50	17.20	16.25	14.75	13.50	14.00	14.00	14.00	14.00	14.00
1930	21.50	21.75	21.85	21.60	20.50	19.50	19.00	19.35	20.00	19.30	17.60	17.50
1929	22.00	22.50	22.35	23.25	22.40	22.25	22.50	22.80	23.00	22.20	21.75	20.50
1928	18.85	18.50	18.20	18.35	18.50	18.50	18.50	19.00	20.00	20.75	21.00	21.00
1927	20.25	19.50	20.00	20.50	19.10	19.10	19.00	19.00	20.00	19.50	18.60	18.50
1926	24.00	22.00	21.50	20.90	19.50	19.75	20.30	21.75	21.60	20.25	20.40	20.30
1925	26.20	25.35	23.85	21.60	21.75	22.40	22.50	22.50	23.00	23.40	24.00	24.00
1924	23.90	24.25	23.75	20.60	19.30	21.40	21.70	22.00	22.25	22.30	23.50	25.00
1923	25.15	27.00	31.30	32.10	28.30	25.00	23.15	22.70	23.50	22.50	20.70	22.50
1922	17.50	17.10	17.10	18.60	20.00	20.60	21.00	20.60	22.90	24.85	25.00	24.50
1921	24.50	22.00	21.20	18.25	18.00	17.00	15.25	15.50	16.30	18.00	17.65	17.25
1920	31.50	33.00	32.60	30.60	30.00	30.75	30.00	33.15	34.00	33.75	31.00	25.50
1919	29.40	24.25	22.50	22.40	22.00	21.25	23.00	24.00	24.00	24.00	25.75	27.50
1918	42.20	40.00	40.00	39.00	39.00	39.00	39.00	39.00	39.00	39.00	38.60	38.50
1917	32.00	30.00	33.00	34.25	36.60	43.50	52.75	43.00	47.25	43.50	39.00	39.00

Machine Shop Turnings, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$9.05	$10.00	$10.75	$10.15	$8.20	$7.45	$7.50	$8.00	$7.30	$7.00	$7.20	$8.50
1933	6.25	6.25	6.30	6.75	8.00	8.40	9.35	10.45	9.75	9.30	8.00	8.00
1932	6.95	7.10	7.25	6.75	6.30	5.25	5.00	5.25	5.95	6.00	6.25	6.00
1931	6.00	6.80	7.80	7.30	6.75	6.50	6.70	7.30	7.50	7.20	7.00	7.00
1930	11.50	11.75	11.00	11.00	10.20	9.50	8.70	8.00	8.00	7.20	6.15	6.00
1929	12.50	11.25	10.65	11.05	11.00	11.35	11.85	12.40	12.00	11.40	10.75	10.25
1928	10.60	10.15	10.15	10.25	9.90	9.20	8.80	9.65	11.00	11.25	10.85	12.00
1927	12.00	11.00	11.60	12.40	11.15	10.50	10.85	12.50	11.75	11.50	11.15	11.45
1926	14.50	13.60	13.00	12.60	11.65	11.00	11.60	12.85	13.05	12.00	11.85	11.50
1925	17.80	16.00	14.75	13.60	12.75	13.25	13.50	14.50	14.85	14.15	14.85	14.50
1924	15.50	16.10	15.00	13.25	11.10	13.00	13.50	14.00	14.75	11.40	16.00	17.50
1923	16.75	18.25	20.65	20.10	18.91	16.60	13.50	11.40	12.75	11.40	11.00	13.50
1922	9.50	9.55	10.65	12.30	13.45	13.65	13.75	13.95	15.45	15.40	16.25	15.90
1921	10.50	10.50	9.75	8.55	8.50	7.90	7.25	7.65	8.55	10.25	10.25	9.20
1920	16.75	19.25	18.40	16.85	15.15	17.65	13.55	15.75	15.80	16.00	14.75	11.60
1919	11.50	9.70	9.75	11.15	10.00	10.65	12.70	14.00	13.25	12.75	14.00	15.50
1918	20.00	20.00	20.00	19.00	18.70	18.50	18.50	18.50	18.50	18.50	18.50	17.75
1917	12.10	12.00	12.45	13.90	14.55	20.80	23.70	21.20	23.25	19.50	19.65	20.00
1916	10.35	9.55	10.75	11.20	10.35	10.05	8.55	7.75	7.25	8.00	9.10	12.75
1915	7.75	7.90	7.90	7.90	7.90	8.15	8.00	7.65	8.65	8.65	9.15	8.75
1914	6.90	7.65	7.65	8.70	8.00	7.90	7.90	7.90	7.90	8.00	7.95	7.75
1913	10.65	10.25	9.50	9.00	8.65	7.25	6.75	6.75	6.75	7.15	7.15	6.40
1912	10.25	9.75	9.50	10.00	10.25	10.90	11.00	11.00	10.65	10.90	11.50	11.25
1911	9.00	9.40	10.50	9.50	9.15	9.15	9.15	9.75	9.65	9.15	9.90	9.35
1910	13.25	13.00	12.00	11.75	11.25	10.25	9.25	9.25	9.00	9.00	9.15	9.25
1909	13.00	11.75	10.25	8.75	8.25	11.25	11.75	11.50	12.50	13.25	13.75	13.25
1908	7.75	8.75	8.75	8.50	8.25	8.25	8.25	9.00	9.50	9.50	10.50	11.75
1907	15.25	15.00	15.75	16.00	15.75	15.50	15.50	15.25	14.50	14.00	11.60	7.75
1906	.....	.....	12.50	11.75	11.25	11.25	11.25	11.50	12.40	12.25	12.40	14.75

Iron Car Wheels, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$10.75	$11.50	$12.50	$12.25	$12.00	$10.40	$10.25	$10.00	$9.75	$9.75	$9.75	$10.60
1933	7.65	8.15	8.35	8.75	9.75	9.75	9.75	9.75	9.75	9.50	9.25	9.75
1932	7.75	7.00	7.00	6.75	6.35	6.00	5.50	6.15	7.00	7.00	7.10	7.00
1931	11.25	10.75	10.60	9.50	9.25	10.20	10.00	9.90	9.50	9.50	9.00	8.75
1930	14.05	14.20	14.50	14.45	13.80	13.50	13.50	13.50	13.50	13.10	12.00	11.50
1929	14.10	14.50	14.50	14.75	14.50	14.20	13.60	14.00	14.00	14.00	13.60	13.65
1928	13.70	14.25	13.95	13.50	13.45	13.10	13.00	13.00	13.00	13.10	14.05	14.05
1927	14.95	15.10	15.00	14.85	14.00	13.50	13.80	14.75	14.25	13.50	13.15	13.40
1926	18.00	16.30	16.70	16.45	15.65	15.40	16.50	16.50	15.75	14.50	14.50	14.60
1925	21.00	19.65	17.50	16.85	15.90	17.40	17.15	17.50	17.60	17.25	18.15	18.40
1924	20.60	21.25	19.90	17.50	16.60	15.65	16.40	16.90	18.40	17.90	18.60	19.50
1923	25.35	26.50	28.50	27.65	24.30	21.50	20.90	19.60	19.60	18.60	17.85	19.00
1922	15.25	14.65	15.90	18.15	18.80	18.25	18.90	20.40	23.50	24.75	24.60	23.75
1921	21.50	21.40	16.60	14.45	14.50	13.70	12.75	13.70	14.90	16.15	16.25	15.90
1920	36.25	38.75	36.15	38.50	38.25	36.00	35.70	38.40	38.80	37.25	33.25	25.80
1919	23.20	21.15	20.00	20.40	20.20	22.00	24.50	25.15	23.50	23.60	28.50	29.75
1918	30.40	30.00	30.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	27.50
1917	19.75	18.30	20.30	23.25	27.90	37.00	36.75	30.70	31.00	25.90	27.50	29.50
1916	14.75	14.05	14.05	14.00	13.15	12.50	11.90	12.00	12.25	12.25	15.95	21.00
1915	10.00	10.00	10.00	10.00	9.75	9.85	10.30	11.40	11.75	11.75	12.75	14.75

Rails for Rolling, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$11.25	$12.00	$12.75	$12.75	$12.37	$11.25	$10.95	$10.50	$10.10	$9.85	$10.25	$11.40
1933	8.00	7.75	7.95	8.50	10.25	10.25	11.15	11.25	11.25	11.10	10.25	10.25
1932	10.30	9.85	9.50	8.90	8.25	7.75	6.60	6.50	7.00	8.00	8.25	8.00
1931	13.00	12.10	12.00	11.85	11.15	10.90	10.50	10.50	10.50	10.50	10.00	10.00
1930	14.65	14.80	15.00	15.00	14.85	14.55	14.50	14.50	14.50	14.10	13.10	13.00
1929	17.10	17.50	17.50	17.50	17.50	17.50	17.50	17.75	17.60	17.05	15.30	14.60
1928	15.00	15.00	14.45	14.00	14.35	14.85	14.50	15.00	15.80	16.40	16.50	16.50
1927	16.00	16.00	15.50	15.85	15.10	14.60	14.60	15.00	15.20	14.70	13.95	14.00
1926	17.55	16.30	16.50	16.00	14.95	15.10	17.10	17.25	17 25	16.85	16.50	16.50
1925	20.95	19.15	18.15	15.85	16.75	18.15	17.45	19.10	19.00	18.55	19.40	18.80
1924	18.90	20.00	19.30	17.10	15.30	14.55	15.50	16.00	17.40	17.20	18.20	19.50
1923	20.55	22.00	24.90	23.65	21.80	19.40	18.40	17.75	18.30	16.25	15.10	17.00
1922	12.50	11.50	12.85	14.25	15.50	15.40	16.00	16.75	19.40	20.50	18.90	18.00
1921	15.80	15.90	13.30	12.70	13.25	12.80	12.45	12.70	13.05	14.00	13.90	12.50
1920	33.60	34.65	32.60	32.50	31.50	32.35	34.90	38.00	38.50	34.00	24.15	17.40
1919	22.30	15.55	16.30	17.95	17.45	19.25	24.70	29.00	25.38	26.80	31.15	31.50
1918	35.30	35.00	35.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
1917	27.25	25.65	27.25	31.90	36.80	46.00	46.25	41.90	41.25	36.00	35.70	35.65
1916	17.70	17.10	17.20	17.90	17.25	16.25	15.70	15.70	16.90	18.75	24.90	29.50
1915	9.50	9.60	10.00	9.85	10.00	10.00	10.10	11.75	13.15	13.25	14.30	16.70
1914	11.00	11.20	11.25	11.25	11.25	11.25	11.25	11.25	10.85	10.00	9.50	9.50
1913	16.25	15.50	15.00	14.50	14.00	14.00	12.00	12.50	12.00	12.00	12.00	11.50
1912	13.00	13.00	12.75	12.75	13.25	13.50	13.25	13.50	14.75	16.00	16.50	16.50
1911	13.50	13.50	13.50	13.00	12.75	12.25	12.25	12.50	12.25	12.25	12.00	12.25
1910	17.75	17.75	17.50	17.50	17.25	16.50	16.50	15.50	15.75	15.75	15.00	14.00
1909	15.80	15.05	12.80	13.20	14.65	15.50	15.55	16.00	17.20	18.00	20.25	17.70
1908	12.30	13.00	12.20	12.75	13.20	14.00	14.45	15.60	16.00	15.70	16.95	17.25

Finished Material

Per pound f.o.b.

Steel Bars, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	1.75c	1.75c	1.75c	1.85c	1.90c	1.90c	1.80c	1.80c	1.80c	1.80c	1.80c	1.80c
1933	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.75	1.75	1.75
1932	1.55	1.50	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1931	1.65	1.65	1.65	1.65	1.65	1.65	1.60	1.60	1.60	1.60	1.60	1.60
1930	1.90	1.85	1.85	1.80	1.75	1.75	1.70	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.95	1.90	1.90	1.90	1.85	1.85	1.80	1.80	1.80	1.75	1.75	1.80
1926	2.00	2.00	2.00	2.00	1.95	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925	2.10	2.10	2.10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1924	2.40	2.40	2.40	2.30	2.25	2.20	2.15	2.10	2.05	2.00	2.05	2.10
1923	2.00	2.15	2.30	2.35	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
1922	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	2.00	2.00
1921	2.35	2.15	2.00	2.05	2.10	2.05	1.85	1.75	1.65	1.60	1.55	1.50
1920	3.10	3.85	3.85	3.65	3.25	3.25	3.25	3.25	3.25	3.25	3.00	2.35
1919	2.70	2.70	2.60	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.45	2.90
1918	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
1917	3.20	3.20	3.45	3.65	3.65	4.00	4.70	4.75	4.25	2.90	2.90	2.90
1916	2.40	2.40	2.65	3.00	3.00	2.85	2.75	2.55	2.60	2.70	2.95	3.15
1915	1.10	1.10	1.15	1.20	1.20	1.20	1.30	1.35	1.30	1.45	1.70	1.90
1914	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.20	1.15	1.10	1.10
1913	1.45	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.35	1.25
1912	1.15	1.15	1.10	1.15	1.20	1.20	1.25	1.30	1.35	1.40	1.40	1.40
1911	1.40	1.40	1.40	1.40	1.40	1.25	1.25	1.20	1.15	1.10	1.10	1.10
1910	1.50	1.45	1.45	1.45	1.45	1.45	1.45	1.40	1.40	1.40	1.40	1.40
1909	1.40	1.30	1.20	1.15	1.20	1.20	1.25	1.35	1.40	1.40	1.45	1.50
1908	1.60	1.60	1.60	1.60	1.60	1.50	1.40	1.40	1.40	1.40	1.40	1.40
1907	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1906	2.00	1.75	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.60
1905	1.45	1.45	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.70	1.80	1.95
1904	1.30	1.30	1.35	1.35	1.30	1.30	1.30	1.30	1.30	1.35	1.30	1.40
1903	1.65	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.30
1902	1.60	1.50	1.50	1.65	1.80	1.80	1.70	1.75	1.75	1.70	1.60	1.70
1901	1.20	1.25	1.45	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.60

Tank Plates, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	1.70c	1.70c	1.70c	1.80c	1.85c	1.85c	1.80c	1.80c	1.80c	1.80c	1.80c	1.80c
1933	1.60	1.60	1.60	1.55	1.50	1.55	1.60	1.60	1.60	1.70	1.70	1.70
1932	1.55	1.50	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1931	1.65	1.65	1.65	1.65	1.65	1.65	1.60	1.60	1.60	1.60	1.60	1.50
1930	1.90	1.85	1.80	1.80	1.75	1.70	1.65	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.90	1.85	1.90	1.85	1.85	1.80	1.80	1.80	1.80	1.75	1.75	1.80
1926	1.90	1.85	1.85	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1925	2.00	2.10	2.10	2.00	2.00	2.00	2.00	1.90	1.80	1.80	1.85	1.90
1924	2.50	2.45	2.40	2.35	2.25	2.15	2.10	2.00	1.95	1.80	1.85	1.90
1923	2.05	2.15	2.35	2.45	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1922	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	2.00	2.00
1921	2.65	2.35	2.05	2.15	2.20	2.00	1.85	1.75	1.70	1.60	1.60	1.50
1920	3.10	3.70	3.75	3.65	3.50	3.50	3.50	3.50	3.50	3.20	3.00	2.65
1919	3.00	3.00	2.90	2.65	2.65	2.65	2.65	2.65	2.55	2.65	2.65	2.70
1918	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917	4.25	4.30	5.00	5.45	6.40	7.75	9.45	9.20	7.50	3.25	3.25	3.25
1916	2.50	2.55	3.15	3.50	3.50	3.50	3.50	3.75	3.70	3.70	3.90	4.25
1915	1.10	1.10	1.15	1.15	1.15	1.20	1.25	1.30	1.35	1.45	1.70	1.95
1914	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.20	1.20	1.10	1.10
1913	1.50	1.50	1.50	1.50	1.50	1.45	1.45	1.45	1.40	1.35	1.30	1.20
1912	1.15	1.10	1.10	1.20	1.25	1.25	1.30	1.35	1.40	1.45	1.50	1.55
1911	1.40	1.40	1.40	1.40	1.40	1.35	1.35	1.30	1.25	1.20	1.10	1.15
1910	1.55	1.55	1.50	1.50	1.50	1.45	1.40	1.40	1.40	1.40	1.40	1.40
1909	1.60	1.45	1.30	1.20	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908	1.70	1.70	1.70	1.70	1.70	1.65	1.60	1.60	1.60	1.60	1.60	1.60
1907	1.70	1.70	1.70	1.70	1.80	1.80	1.80	1.70	1.70	1.70	1.70	1.70
1906	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.70
1905	1.45	1.50	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.60	1.60	1.60
1904	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.40	1.40	1.40	1.50
1903	1.60	1.60	1.75	1.75	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1902	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1901	1.40	1.40	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1900	2.40	2.20	2.00	1.80	1.60	1.35	1.05	1.10	1.05	1.05	1.35	1.40
1899	1.30	1.45	1.75	2.05	2.10	2.30	2.45	2.55	2.85	2.80	2.50	2.30
1898	1.00	1.00	0.95	1.00	1.10	1.10	1.10	1.10	1.15	1.10	1.10	1.15
1897	1.10	1.10	1.10	1.05	1.05	1.00	1.00	1.00	1.00	1.05	1.00	1.00
1896	1.40	1.35	1.30	1.35	1.30	1.25	1.25	1.20	1.15	1.15	1.10	1.10
1895	1.15	1.10	1.10	1.15	1.20	1.25	1.60	1.70	1.80	1.70	1.60	1.50

Structural Shapes, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	1.70c	1.70c	1.70c	1.80c	1.85c	1.85c	1.80c	1.80c	1.80c	1.80c	1.80c	1.80c
1933	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.70
1932	1.55	1.50	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1931	1.60	1.60	1.60	1.65	1.65	1.65	1.60	1.60	1.60	1.60	1.60	1.50
1930	1.90	1.85	1.80	1.80	1.75	1.70	1.65	1.65	1.60	1.60	1.60	1.60
1929	1.90	1.90	1.90	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90
1928	1.80	1.85	1.90	1.85	1.85	1.85	1.85	1.85	1.90	1.95	1.95	1.90
1927	1.95	1.90	1.90	1.90	1.85	1.80	1.80	1.80	1.80	1.75	1.75	1.80
1926	1.90	1.90	1.90	1.90	1.90	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925	2.10	2.10	2.10	2.00	2.00	2.00	2.00	2.00	1.90	1.90	2.00	1.95
1924	2.50	2.50	2.50	2.35	2.25	2.20	2.15	2.05	2.00	2.00	2.00	2.00
1923	2.05	2.15	2.35	2.45	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1922	1.50	1.40	1.45	1.50	1.60	1.65	1.70	1.80	2.00	2.00	2.00	1.95
1921	2.45	2.25	2.10	2.15	2.20	2.05	1.90	1.75	1.70	1.60	1.60	1.50
1920	2.65	3.15	3.25	3.25	3.25	3.25	3.25	3.15	3.10	3.10	3.00	2.45
1919	2.80	2.80	2.70	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.50
1918	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
1917	3.10	3.25	3.45	3.70	4.00	4.00	4.50	4.50	3.75	3.00	3.00	3.00
1916	1.85	2.05	2.40	2.50	2.50	2.50	2.50	2.50	2.60	2.70	2.90	3.00
1915	1.10	1.10	1.15	1.15	1.20	1.20	1.25	1.30	1.35	1.40	1.65	1.75
1914	1.20	1.20	1.20	1.20	1.15	1.10	1.10	1.15	1.20	1.15	1.10	1.05
1913	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.40	1.35	1.30	1.25
1912	1.15	1.15	1.15	1.20	1.25	1.25	1.30	1.35	1.40	1.45	1.50	1.55
1911	1.40	1.40	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.30	1.20	1.15
1910	1.55	1.55	1.50	1.50	1.50	1.45	1.40	1.40	1.40	1.40	1.40	1.40
1909	1.60	1.45	1.30	1.20	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908	1.70	1.70	1.70	1.70	1.70	1.65	1.65	1.60	1.60	1.60	1.60	1.60
1907	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1906	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1905	1.50	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.70	1.70
1904	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.40	1.40	1.40	1.40
1903	1.75	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1902	1.60	1.60	1.70	1.85	2.00	2.25	2.25	2.35	2.25	2.15	2.10	2.00
1901	1.50	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1900	2.25	2.25	2.25	2.25	2.25	2.05	1.90	1.75	1.70	1.70	1.70	1.70
1899	1.30	1.30	1.40	1.50	1.50	1.75	1.95	2.05	2.25	2.25	2.25	2.25
1898	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.20	1.20	1.20	1.20	1.20
1897	1.55	1.55	1.55	1.55	1.30	1.05	1.00	1.00	1.00	1.10	1.10	1.10
1896	1.45	1.50	1.45	1.45	1.50	1.55	1.55	1.55	1.55	1.55	1.50	1.45
1895	1.25	1.20	1.20	1.20	1.20	1.35	1.50	1.60	1.65	1.60	1.60	1.55

No. 10 Blue Annealed Sheets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	1.75c	1.75c	1.75c	1.90c	2.00c	2.00c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c
1933	1.65	1.60	1.55	1.55	1.55	1.65	1.75	1.65	1.70	1.75	1.75	1.75
1932	1.75	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1931	1.90	1.90	1.90	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85
1930	2.15	2.10	2.10	2.10	2.00	2.00	2.00	1.95	1.95	1.95	1.90	1.90
1929	2.10	2.10	2.10	2.15	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.15
1928	2.10	2.10	2.10	2.05	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.10
1927	2.25	2.20	2.20	2.20	2.25	2.25	2.25	2.25	2.25	2.15	2.10	2.10
1926	2.50	2.50	2.50	2.50	2.45	2.35	2.30	2.30	2.30	2.35	2.40	2.40
1925	2.70	2.70	2.65	2.55	2.45	2.30	2.30	2.30	2.25	2.25	2.40	2.50
1924	2.95	2.90	2.95	2.80	2.80	2.80	2.75	2.70	2.70	2.60	2.60	2.60
1923	2.50	2.50	2.70	2.80	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.90
1922	2.25	2.25	2.25	2.35	2.40	2.40	2.40	2.45	2.50	2.60	2.60	2.50
1921	3.55	3.55	3.05	2.95	3.10	3.00	2.55	2.40	2.30	2.50	2.40	2.25
1920	4.05	5.50	5.50	4.85	5.00	5.00	5.00	5.00	5.00	5.00	4.95	3.65
1919	3.90	3.90	3.80	3.55	3.55	3.50	3.50	3.55	3.55	3.55	3.55	3.55
1918	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
1917	4.10	4.35	4.70	5.35	6.65	8.00	8.50	8.50	8.50	7.85	4.75	4.25
1916	2.45	2.60	2.85	3.00	3.05	3.10	3.00	3.00	2.95	3.15	3.30	3.90
1915	1.30	1.30	1.30	1.30	1.35	1.35	1.35	1.35	1.50	1.60	1.85	2.25
1914	1.35	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.40	1.40	1.40	1.35
1913	1.70	1.75	1.75	1.75	1.75	1.75	1.70	1.65	1.60	1.55	1.45	1.40

Automobile Sheets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.75c	2.75c	2.75c	3.05c	3.15c	3.10c	2.95c	2.95c	2.95c	2.95c	2.95c	2.95c
1933	2.40	2.45	2.45	2.55	2.55	2.55	2.55	2.60	2.75	2.75	2.75	2.75
1932	2.90	2.85	2.85	2.80	2.80	2.80	2.80	2.70	2.75	2.65	2.60	2.60
1931	3.30	3.30	3.30	3.15	3.05	3.10	3.10	3.10	3.10	3.10	3.10	3.00
1930	3.90	3.90	3.90	3.80	3.80	3.60	3.60	3.60	3.60	3.45	3.35	3.30
1929	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.05	4.00	4.00
1928	4.00	4.10	4.15	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.05	4.10
1927	4.20	4.15	4.15	4.15	4.25	4.25	4.25	4.25	4.25	4.15	4.15	4.10
1926	4.50	4.40	4.40	4.35	4.30	4.25	4.20	4.25	*4.25	4.25	4.25	4.25
1925	4.75	4.70	4.55	4.45	4.35	4.30	4.25	4.25	4.25	4.35	4.45	4.50
1924	5.35	5.35	5.30	5.35	5.10	5.10	5.10	4.85	4.75	4.60	4.65	4.70
1923	4.85	4.95	5.35	5.50	5.50	5.50	5.35	5.35	5.35	5.35	5.35	5.35
1922	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.85	4.85

*No. 22 gage previous to September, 1926; No. 20 gage since.

No. 24 Black Sheets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.25c	2.25c	2.25c	2.50c	2.65c	2.65c	2.45c	2.40c	2.40c	2.40c	2.40c	2.40c
1933	2.05	2.00	2.00	2.00	2.00	2.10	2.25	2.25	2.25	2.25	2.25	2.25
1932	2.20	2.15	2.20	2.20	2.20	2.20	2.20	2.15	2.10	2.10	2.10	2.20
1931	2.35	2.35	2.35	2.25	2.25	2.15	2.40	2.40	2.40	2.40	2.40	2.40
1930	2.70	2.65	2.65	2.65	2.55	2.55	2.55	2.50	2.40	2.40	2.35	2.35
1929	2.85	2.85	2.85	2.90	2.95	2.95	2.85	2.85	2.85	2.80	2.75	2.75
1928	2.80	2.85	2.85	2.75	2.75	2.70	2.65	2.65	2.70	2.70	2.80	2.85
1927	2.95	2.90	2.90	2.80	2.90	3.00	3.00	3.00	3.00	2.95	2.80	2.75
1926	3.35	3.35	3.25	3.25	3.20	3.10	3.10	3.10	*3.05	3.05	3.10	3.10
1925	3.50	3.50	3.40	3.35	3.25	3.15	3.15	3.15	3.10	3.10	3.25	3.35
1924	3.75	3.75	3.75	3.70	3.65	3.65	3.60	3.50	3.45	3.40	3.45	3.50
1923	3.35	3.35	3.55	3.85	3.85	3.85	3.85	3.85	3.75	3.75	3.75	3.75
1922	3.00	3.00	3.00	3.10	3.15	3.15	3.15	3.25	3.40	3.50	3.35	3.30
1921	4.35	4.20	3.90	3.90	4.00	3.90	3.35	3.05	2.80	3.00	2.95	3.00
1920	5.00	6.00	6.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	6.05	4.45
1919	4.70	4.70	4.60	4.35	4.35	4.30	4.30	4.35	4.35	4.35	4.35	4.35
1918	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1917	4.55	4.55	5.05	5.75	7.00	8.15	9.00	9.00	8.75	7.75	5.30	5.00
1916	2.55	2.60	2.75	2.90	2.95	2.90	2.90	2.75	2.85	3.20	3.65	4.45
1915	1.80	1.80	1.80	1.80	1.80	1.80	1.75	1.85	1.90	2.05	2.20	2.50
1914	1.85	1.95	1.95	1.90	1.85	1.80	1.80	1.90	1.95	1.95	1.90	1.80
1913	2.30	2.35	2.35	2.35	2.35	2.30	2.25	2.20	2.10	2.00	1.95	1.90
1912	1.90	1.85	1.80	1.85	1.95	1.95	2.00	2.05	2.10	2.20	2.25	2.25
1911	2.20	2.20	2.20	2.15	2.15	2.00	2.00	1.95	1.90	1.85	1.85	1.90
1910	2.40	2.40	2.40	2.35	2.30	2.25	2.20	2.20	2.15	2.15	2.15	2.15
1909	2.40	2.40	2.30	2.20	2.20	2.20	2.20	2.20	2.20	2.30	2.40	2.40
1908	2.55	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1907	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60

*No. 28 gage before Sept. 1, 1926.

No. 24 Galvanized Sheets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.85c	2.85c	2.85c	3.10c	3.25c	3.25c	3.10c	3.10c	3.10c	3.10c	3.10c	3.10c
1933	2.70	2.50	2.60	2.65	2.70	2.70	2.85	2.85	2.85	2.85	2.85	2.85
1932	2.80	2.75	2.80	2.85	2.85	2.85	2.85	2.80	2.75	2.80	2.85	2.85
1931	2.90	2.90	2.90	2.85	2.80	2.80	2.90	2.90	2.90	2.90	2.90	2.90
1930	3.35	3.30	3.30	3.30	3.25	3.20	3.15	3.10	3.00	3.00	2.95	2.90
1929	3.60	3.60	3.60	3.65	3.70	3.65	3.60	3.55	3.50	3.50	3.45	3.40
1928	3.65	3.65	3.75	3.65	3.65	3.55	3.50	3.50	3.50	3.50	3.55	3.60
1927	3.80	3.70	3.70	3.65	3.80	3.80	3.85	3.85	3.85	3.80	3.70	3.60
1926	4.60	4.60	4.60	4.60	4.55	4.30	4.30	4.30	*3.95	3.90	3.95	3.95
1925	4.75	4.75	4.70	4.55	4.35	4.20	4.20	4.20	4.20	4.25	4.50	4.60
1924	4.95	4.90	4.90	4.85	4.80	4.80	4.70	4.60	4.60	4.60	4.60	4.60
1923	4.35	4.35	4.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.85	4.90
1922	4.00	4.00	4.00	4.10	4.15	4.15	4.15	4.25	4.40	4.50	4.35	4.35
1921	5.70	5.50	5.05	4.90	5.00	4.90	4.35	4.05	3.80	4.00	3.95	4.00
1920	6.35	7.00	7.25	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.35	5.85
1919	6.05	6.05	5.95	5.70	5.70	5.65	5.65	5.70	5.70	5.70	5.70	5.70
1918	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1917	6.55	6.80	6.80	7.55	8.80	9.95	10.25	10.25	9.70	8.80	6.50	6.25
1916	4.75	4.75	4.80	4.85	4.85	4.80	4.35	4.25	4.20	4.45	5.05	6.25
1915	2.75	3.00	3.40	3.30	3.40	4.45	4.55	3.95	3.65	3.50	3.90	4.75
1914	2.85	2.95	2.95	2.90	2.80	2.75	2.75	2.85	2.95	2.95	2.85	2.80
1913	3.45	3.50	3.50	3.50	3.40	3.40	3.30	3.25	3.15	3.05	2.95	2.85
1912	3.20	3.20	3.00	3.00	3.10	3.10	3.10	3.30	3.50	3.50	3.50	3.50
1911	3.20	3.20	3.20	3.20	3.20	3.00	3.00	3.00	2.80	3.00	3.00	3.20
1910	3.70	3.70	3.70	3.70	3.50	3.20	3.20	3.20	3.20	3.20	3.20	3.20
1909	3.40	3.30	3.40	3.40	3.40	3.50	3.50	3.50	3.60	3.60	3.70	3.70
1908	3.70	3.70	3.70	3.60	3.50	3.50	3.50	3.50	3.30	3.30	3.20	3.20
1907	4.00	4.00	4.00	3.80	3.80	3.80	3.70	3.70	3.60	3.60	3.50	3.50
1906	3.60	3.60	3.70	3.80	3.80	3.80	3.80	3.90	3.80	4.00	4.00	4.00
1905	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1904	3.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.50
1903	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.50	3.50	3.50

*No. 28 gage before Sept. 1, 1926.

Cold-Finished Steel Bars, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c	2.10c
1933	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.95	1.95	1.95	1.95	1.95
1932	2.00	2.00	1.90	1.90	1.75	1.70	1.70	1.70	1.70	1.70	1.70	1.70
1931	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.00
1930	2.15	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.05	2.00
1929	2.20	2.20	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.20	2.20
1928	2.30	2.25	2.25	2.20	2.20	2.15	2.10	2.15	2.20	2.20	2.20	2.20
1927	2.35	2.35	2.40	2.40	2.40	2.35	2.30	2.30	2.20	2.15	2.10	2.10
1926	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.45	2.40	2.40
1925	2.80	2.80	2.75	2.70	2.70	2.60	2.55	2.50	2.50	2.45	2.50	2.50
1924	3.00	3.00	3.00	3.00	3.00	2.90	2.85	2.80	2.75	2.70	2.70	2.80
1923	2.50	2.65	2.85	3.00	3.25	3.25	3.25	3.25	3.25	3.25	3.00	2.90
1922	2.00	1.90	1.85	1.85	2.00	2.00	2.05	2.15	2.50	2.50	2.50	2.50
1921	3.60	3.60	3.10	3.05	3.10	3.00	2.75	2.50	2.40	2.25	2.15	2.00
1920	3.65	3.85	4.50	5.25	4.40	4.50	4.10	4.55	4.25	4.10	4.00	3.60

Tin Plate, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25	$5.25
1933	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.65	4.65	4.65	5.25
1932	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.50	4.25
1931	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.75	4.75	4.75
1930	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.00	5.00	5.00
1929	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35	5.35
1928	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.30	5.35
1927	5.50	5.50	5.50	5.50	5.50	5.45	5.50	5.50	5.50	5.30	5.30	5.25
1926	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1925	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1924	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1923	4.75	4.75	4.95	4.95	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1922	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75
1921	7.00	7.00	7.00	6.65	6.25	6.25	5.65	5.25	5.15	5.00	4.80	4.75
1920	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1919	7.35	7.35	7.25	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1918	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75
1917	6.90	7.00	7.50	7.50	7.50	9.25	10.00	10.00	10.00	10.00	8.20	7.75
1916	3.75	3.75	4.15	4.70	5.15	5.55	5.80	6.00	5.60	5.75	6.05	6.50
1915	3.10	3.10	3.10	3.20	3.20	3.10	3.10	3.10	3.10	3.10	3.35	3.60
1914	3.40	3.40	3.40	3.40	3.40	3.30	3.25	3.45	3.55	3.35	3.15	3.20
1913	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.55	3.50	3.40
1912	3.40	3.40	3.50	3.50	3.50	3.50	3.50	3.70	3.70	3.70	3.70	3.60
1911	3.70	3.70	3.70	3.60	3.60	3.60	3.60	3.50	3.50	3.40	3.40	3.40
1910	3.50	3.50	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
1909	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.50	3.50	3.50
1908	3.60	3.60	3.60	3.60	3.60	3.50	3.50	3.50	3.50	3.50	3.50	3.40
1907	3.90	3.90	3.90	3.90	3.80	3.80	3.70	3.70	3.70	3.60	3.60	3.60
1906	3.50	3.50	3.50	3.60	3.70	3.70	3.80	3.90	3.90	3.90	4.00	4.00
1905	3.50	3.50	3.50	3.50	3.50	3.40	3.40	3.40	3.30	3.30	3.40	3.50
1904	3.40	3.40	3.30	3.30	3.20	3.20	3.20	3.10	3.30	3.40	3.50	3.50
1903	3.80	3.80	3.90	3.90	3.80	3.80	3.70	3.70	3.60	3.60	3.60	3.50

Cold-Rolled Strip, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.40c	2.40c	2.40c	2.65c	2.80c	2.80c	2.60c	2.60c	2.60c	2.60c	2.60c	2.60c
1933	1.95	1.80	1.85	1.80	1.90	2.00	2.25	2.25	2.30	2.40	2.40	2.40
1932	2.00	1.90	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.95	2.00	2.00
1931	2.25	2.25	2.25	2.20	2.15	2.15	2.15	2.15	2.15	2.15	2.10	2.05
1930	2.70	2.65	2.60	2.55	2.50	2.45	2.45	2.40	2.35	2.35	2.35	2.25
1929	2.85	2.85	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1928	3.00	3.10	3.15	*2.75	2.75	2.75	2.75	2.70	2.75	2.75	2.80	2.85
1927	3.10	2.90	2.95	3.00	3.00	3.25	3.25	3.25	3.15	2.95	2.95	3.00
1926	3.90	3.90	3.90	3.85	3.75	3.70	3.65	3.50	3.50	3.50	3.25	3.25
1925	4.10	4.15	4.05	4.00	3.85	3.65	3.75	3.75	3.75	3.75	3.90	3.90
1924	5.00	4.80	4.80	4.75	4.50	4.50	4.35	4.20	4.00	4.00	4.00	4.15
1923	4.50	4.65	4.80	5.15	5.25	5.25	5.00	5.00	5.00	5.00	5.00	4.75
1922	3.50	3.50	3.50	3.60	3.70	3.95	4.00	4.00	4.25	4.50	4.50	4.50
1921	6.25	6.25	5.65	5.50	5.50	5.00	4.40	3.90	3.75	3.75	3.80	3.75
1920	5.65	7.00	8.80	8.50	8.50	8.50	8.50	8.50	7.35	8.50	8.00	6.85
1919	6.25	6.25	6.10	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65
1918	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1917	6.50	6.50	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.50	6.50
1916	4.25	4.65	5.50	6.00	6.00	6.00	6.00	6.00	6.00	6.50	6.50	6.50
1915	2.75	2.75	2.75	2.75	2.75	2.85	2.85	3.00	3.10	3.25	3.50	3.75
1914	3.05	3.05	3.05	3.05	3.05	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1913	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.05
1912	2.95	2.95	2.95	2.95	3.00	3.05	3.05	3.05	3.05	3.15	3.20	3.25
1911	2.95	2.95	3.25	3.25	3.25	2.95	2.95	2.95	2.95	2.95	2.95	2.95
1910	.....	.....	.....	.....	.....	.....	2.95	2.95	2.95	2.95	2.95	2.95

*April, 1928, and subsequently, prices are for 3 tons or over instead of less than 3 tons.

Hot-Rolled Strip, Wide, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	1.75c	1.75c	1.75c	1.95c	2.00c	2.00c	1.85c	1.85c	1.85c	1.85c	1.85c	1.85c
1933	1.45	1.45	1.45	1.45	1.55	1.55	1.60	1.65	1.70	1.75	1.75	1.75
1932	1.40	1.40	1.40	1.45	1.50	1.50	1.45	1.45	1.45	1.45	1.45	1.45
1931	1.55	1.55	1.55	1.55	1.50	1.50	1.55	1.55	1.55	1.55	1.50	1.45
1930	1.85	1.80	1.80	1.70	1.70	1.70	1.65	1.65	1.65	1.60	1.55	1.55
1929	1.80	1.85	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
1928	1.85	1.85	1.90	1.90	1.85	1.85	1.90	1.85	1.80	1.80	1.80	1.80
1927	2.20	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.00	1.90
1926	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1925	2.35	2.40	2.35	2.20	2.20	2.20	2.20	2.20	2.20	2.25	2.30	2.30
1924	3.00	2.95	2.85	2.75	2.60	2.55	2.50	2.50	2.45	2.35	2.25	2.35
1923	2.75	2.85	3.10	3.30	3.30	3.30	3.20	3.15	3.10	3.00	3.00	2.75
1922	2.00	1.80	1.80	1.95	2.05	2.35	2.50	2.50	2.75	2.90	2.90	2.80
1921	3.30	3.30	2.85	2.75	2.75	2.70	2.50	2.30	2.15	2.15	2.25	2.00
1920	3.70	4.80	5.25	5.45	5.50	5.50	5.50	5.50	5.50	5.50	5.00	3.90
1919	3.80	3.55	3.30	3.25	3.05	3.05	3.10	3.30	3.30	3.30	*3.30	*3.30
1918	4.50	4.50	4.50	4.50	4.25	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917	.....	.....	.....	.....	.....	7.25	7.25	7.25	7.00	7.00	5.25	4.50

*First quarter 1920 delivery.

Plain Wire, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.20c	2.20c	2.20c	2.25c	2.30c	2.30c	2.30c	2.30c	2.30c	2.30c	2.30c	2.30c
1933	2.15	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.20
1932	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
1931	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
1930	2.40	2.40	2.40	2.40	2.35	2.30	2.30	2.30	2.30	2.30	2.30	2.25
1929	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40
1928	2.40	2.45	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.40	2.40	2.50
1927	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
1926	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925	2.60	2.60	2.60	2.55	2.50	2.45	2.50	2.50	2.50	2.50	2.50	2.50
1924	2.75	2.75	2.75	2.75	2.70	2.65	2.60	2.60	2.55	2.50	2.50	2.60
1923	2.45	2.60	2.65	2.70	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1922	2.25	2.20	2.25	2.25	2.25	2.25	2.25	2.25	2.40	2.45	2.45	2.45
1921	3.25	3.20	3.00	3.00	3.00	2.75	2.50	2.50	2.60	2.60	2.60	2.25
1920	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.20	3.25	3.25	3.25
1919	3.25	3.25	3.20	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.15	3.25
1918	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917	2.95	2.95	3.10	3.20	3.45	3.60	3.95	3.95	3.95	3.85	3.25	3.25
1916	1.95	2.10	2.25	2.25	2.45	2.45	2.45	2.55	2.55	2.60	2.80	2.95
1915	1.30	1.35	1.40	1.40	1.35	1.35	1.40	1.40	1.55	1.60	1.70	1.90
1914	1.35	1.40	1.40	1.40	1.35	1.30	1.30	1.35	1.35	1.40	1.40	1.30
1913	1.55	1.55	1.55	1.60	1.60	1.60	1.50	1.45	1.45	1.40	1.40	1.35
1912	1.35	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.50	1.55	1.55	1.55

Wire Nails, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$2.35	$2.35	$2.35	$2.50	$2.60	$2.60	$2.60	$2.60	$2.60	$2.60	$2.60	$2.60
1933	1.90	1.85	1.85	1.85	1.85	1.85	2.05	2.10	2.10	2.10	2.10	2.35
1932	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1931	1.90	1.90	1.90	1.90	1.90	1.80	1.85	1.90	1.90	1.90	1.90	1.90
1930	2.35	2.30	2.30	2.25	2.15	2.15	2.10	2.05	2.00	2.00	1.95	1.90
1929	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.50	2.45	2.40	2.40
1928	2.50	2.60	2.65	2.60	2.60	2.60	2.55	2.55	2.55	2.55	2.55	2.65
1927	2.65	2.60	2.55	2.55	2.50	2.55	2.55	2.55	2.55	2.55	2.50	2.50
1926	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
1925	2.85	2.85	2.85	2.20	2.25	2.75	2.65	2.65	2.65	2.65	2.65	2.65
1924	3.00	3.00	3.00	3.00	2.95	2.90	2.85	2.85	2.80	2.75	2.75	2.85
1923	2.70	2.75	2.90	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
1922	2.50	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.65	2.70	2.70	2.70
1921	3.25	3.00	3.00	3.25	3.25	3.00	2.75	2.75	2.90	2.90	2.90	2.50
1920	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1919	3.50	3.50	3.45	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.45	3.50
1918	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917	3.00	3.00	3.15	3.20	3.50	3.65	4.00	4.00	4.00	3.90	3.50	3.50
1916	2.15	2.20	2.40	2.40	2.50	2.50	2.50	2.60	2.60	2.65	2.85	3.00
1915	1.50	1.55	1.60	1.60	1.55	1.55	1.60	1.60	1.70	1.75	1.85	2.00
1914	1.55	1.60	1.60	1.60	1.60	1.55	1.55	1.55	1.60	1.60	1.60	1.50
1913	1.75	1.75	1.75	1.80	1.80	1.80	1.75	1.70	1.65	1.60	1.60	1.60
1912	1.55	1.60	1.60	1.60	1.60	1.60	1.60	1.65	1.70	1.70	1.75	1.75
1911	1.70	1.75	1.80	1.80	1.75	1.80	1.70	1.70	1.65	1.65	1.55	1.55
1910	1.85	1.85	1.85	1.85	1.80	1.80	1.70	1.70	1.70	1.70	1.65	1.70
1909	1.95	1.95	1.95	1.95	1.60	1.70	1.70	1.80	1.80	1.80	1.80	1.85
1908	2.05	2.05	2.05	2.05	2.05	2.00	1.95	1.95	1.95	1.95	1.95	1.95
1907	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.05	2.05	2.05	2.05

Hoops, Pittsburgh

Now quoted as hot-rolled strip

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928	2.10c	2.15c	2.20c	2.15c	2.15c	2.10c	2.10c	2.05c	2.10c	2.10c	2.00c	2.00c
1927	2.40	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.25	2.20	2.15
1926	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925	2.35	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.45	2.50	2.50
1924	3.00	3.00	2.85	2.75	2.75	2.70	2.60	2.60	2.55	2.50	2.50	2.50
1923	2.75	2.85	3.10	3.30	3.30	3.30	3.15	3.15	3.15	3.15	3.00	2.90
1922	1.95	1.85	1.80	1.95	2.05	2.35	2.45	2.55	2.75	2.90	2.90	2.80
1921	3.05	3.05	2.70	2.75	2.75	2.70	2.45	2.40	2.30	2.25	2.20	2.15
1920	3.05	3.05	3.50	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
1919	3.30	3.30	3.25	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
1918	3.05	3.50	3.05	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917	3.50	3.50	3.90	4.10	4.70	5.75	6.00	6.00	6.00	6.00	4.60	3.50
1916	2.00	2.25	2.55	2.75	2.75	2.75	2.75	2.80	3.00	3.00	3.25	3.25
1915	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.30	1.40	1.50	1.75	1.95
1914	1.40	1.30	1.30	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
1913	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.50	1.40
1912	1.30	1.25	1.25	1.25	1.25	1.25	1.35	1.40	1.40	1.45	1.50	1.50
1911	1.50	1.50	1.45	1.45	1.45	1.45	1.40	1.40	1.35	1.35	1.30	1.30
1910	1.60	1.60	1.60	1.60	1.50	1.55	1.55	1.55	1.50	1.50	1.50	1.50
1909	1.80	1.75	1.60	1.60	1.50	1.40	1.40	1.40	1.50	1.50	1.50	1.55
1908	2.00	2.00	2.00	2.00	2.00	1.90	1.80	1.80	1.80	1.80	1.80	1.80

Bands, Pittsburgh

Now quoted as hot-rolled strip

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1928	2.10c	2.10c	2.10c	2.05c	2.00c	2.00c	2.00c	1.95c	1.95c	2.00c	1.90c	1.90c
1927	2.40	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.25	2.20	2.15
1926	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.45	2.50	2.50
1924	3.00	3.00	2.85	2.75	2.75	2.70	2.60	2.60	2.40	2.40	2.40	2.40
1923	2.75	2.85	3.10	3.30	3.30	3.30	3.15	3.15	3.15	3.15	3.00	2.90
1922	1.75	1.75	1.70	1.85	2.05	2.35	2.45	2.55	2.75	2.90	2.90	2.80
1921	3.05	3.05	2.70	2.75	2.75	2.70	2.35	2.20	2.20	2.25	2.15	2.00
1920	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
1919	3.30	3.30	3.25	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
1918	2.90	2.90	2.90	2.90	3.00	2.50	2.50	2.60	2.60	2.60	2.75	2.90
1917	3.00	3.00	3.35	3.35	3.60	5.50	6.00	6.00	6.00	6.00	4.30	2.90
1916	1.85	2.05	2.35	2.55	2.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

Rail Steel Bars, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	1.70c	1.70c	1.70c	1.79c	1.85c	1.85c	1.77c	1.75c	1.75c	1.75c	1.75c	1.75c
1933	1.50	1.45	1.45	1.45	1.50	1.50	1.50	1.50	1.60	1.70	1.70	1.70
1932	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1931	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.50	1.50	1.50
1930	1.85	1.85	1.85	1.85	1.80	1.75	1.75	1.65	1.65	1.65	1.65	1.65
1929	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.95	1.90
1928	1.80	1.80	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.90	1.95	2.00
1927	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.80	1.80	1.80
1926	2.00	2.00	2.00	2.00	2.00	1.90	2.00	2.00	2.00	2.00	2.00	2.00
1925	2.03	2.13	2.07	2.00	2.10	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1924	2.30	2.30	2.30	2.30	2.20	2.15	2.10	2.05	2.05	2.00	2.00	2.00
1923	2.00	2.00	2.25	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
1922	1.60	1.50	1.50	1.55	1.65	1.65	1.70	1.80	1.95	2.00	2.00	2.00
1921	2.50	2.50	2.50	2.15	2.00	2.00	1.95	1.85	1.85	1.75	1.70	1.65
1920	2.90	3.20	3.35	3.70	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
1919	2.80	2.80	2.80	2.55	2.45	2.45	2.45	2.55	2.55	2.55	2.75	2.85
1918	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Tie Plates, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c	1.90c
1933	1.75	1.75	1.75	1.75	1.75	1.75	1.80	1.80	1.80	1.80	1.80	1.80
1932	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.75	1.75	1.75
1931	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.99
1930	2.10	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.00	1.95
1929	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
1928	2.25	2.25	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
1927	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.25	2.25
1926	2.30	2.25	2.25	2.25	2.25	2.25	2.25	2.30	2.35	2.35	2.35	2.35
1925	2.35	2.45	2.45	2.40	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35
1924	2.60	2.60	2.60	2.60	2.60	2.60	2.55	2.45	2.45	2.35	2.35	2.35
1923	2.40	2.45	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
1922	1.90	1.85	1.75	1.80	1.85	1.85	1.85	2.00	2.20	2.35	2.35	2.35
1921	3.00	3.00	3.00	2.75	2.50	2.50	2.40	2.15	2.00	2.00	2.00	1.90
1920	2.75	2.75	2.75	2.75	2.75	2.75	2.80	3.00	3.00	3.00	3.00	3.00
1919	3.00	3.00	3.00	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1918	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1917	2.75	2.75	2.90	3.00	3.00	3.00	3.40	3.50	3.50	3.50	3.50	3.45
1916	1.80	2.05	2.25	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.75
1915	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.50	1.70	1.80

Railroad Spikes, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c	2.40c
1933	2.40	2.40	2.25	2.25	2.15	2.15	2.40	2.40	2.40	2.40	2.40	2.40
1932	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.40	2.40	2.40
1931	2.80	2.80	2.80	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.65
1930	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1929	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1928	2.70	2.75	2.75	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1927	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
1926	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.75	2.80	2.80	2.80	2.80
1925	2.90	2.90	2.85	2.80	2.80	2.80	2.80	2.75	2.75	2.80	2.80	2.80
1924	3.05	3.05	3.05	3.00	2.95	2.90	2.80	2.80	2.75	2.70	2.75	2.80
1923	2.85	2.90	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.05
1922	2.25	2.15	2.05	2.20	2.25	2.30	2.25	2.30	2.80	2.80	2.75	2.75
1921	3.65	3.65	3.30	3.30	3.25	3.25	3.00	2.75	2.45	2.35	2.30	2.25
1920	3.45	3.70	3.95	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.75
1919	3.65	3.65	3.55	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35
1918	4.00	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1917	3.40	3.40	3.50	3.65	3.90	4.20	4.70	6.20	6.50	6.15	5.00	4.75
1916	2.15	2.25	2.50	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	3.25

Bar Iron, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	1.60c	1.60c	1.60c	1.60c	1.75c	1.80c	1.77c	1.75c	1.75c	1.75c	1.75c	1.75c
1933	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	*1.60	1.60	1.60	1.60
1932	1.60	1.70	1.70	1.70	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
1931	1.70	1.75	1.70	1.80	1.80	1.70	1.70	1.70	1.70	1.70	1.65	1.60
1930	2.00	1.95	1.95	1.95	1.90	1.90	1.90	1.80	1.75	1.75	1.70	1.70
1929	2.00	2.05	2.00	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.00	2.00
1928	1.90	1.95	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1927	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.90	1.85	1.90
1926	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
1925	2.00	2.00	2.10	2.10	2.10	2.05	1.95	1.90	1.90	1.90	2.00	2.00
1924	2.40	2.40	2.40	2.35	2.30	2.25	2.20	2.15	2.15	2.10	2.10	2.00
1923	2.35	2.45	2.55	2.60	2.60	2.60	2.55	2.50	2.40	2.40	2.40	2.40
1922	1.60	1.60	1.60	1.65	1.65	1.75	1.80	2.00	2.25	2.50	2.50	2.35
1921	2.75	2.65	2.65	2.50	2.45	2.25	1.95	1.75	1.75	1.75	1.70	1.65
1920	3.15	3.45	3.50	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.50
1919	3.15	2.95	2.85	2.55	2.50	2.55	2.65	2.65	2.65	2.70	2.75	2.75
1918	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1917	3.00	3.00	3.00	3.20	3.40	4.00	4.50	4.50	4.50	4.50	4.00	4.00
1916	1.85	1.90	2.20	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.50	2.60
1915	0.95	1.05	1.10	1.15	1.15	1.15	1.20	1.25	1.30	1.35	1.50	1.70
1914	1.15	1.20	1.15	1.15	1.10	1.10	1.05	1.05	1.05	1.05	0.95	0.95
1913	1.60	1.60	1.60	1.55	1.55	1.55	1.50	1.45	1.35	1.25	1.15	1.15
1912	1.15	1.15	1.15	1.15	1.25	1.25	1.35	1.40	1.45	1.50	1.55	1.55
1911	1.30	1.30	1.25	1.20	1.20	1.20	1.20	1.20	1.20	1.15	1.15	1.15
1910	1.60	1.60	1.55	1.55	1.50	1.45	1.40	1.40	1.40	1.35	1.35	1.30
1909	1.50	1.50	1.40	1.30	1.25	1.30	1.35	1.40	1.50	1.50	1.55	1.60
1908	1.60	1.55	1.55	1.55	1.55	1.55	1.50	1.50	1.50	1.50	1.50	1.50
1907	1.80	1.80	1.80	1.80	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75

*Beginning September, Terre Haute, Ind., base quoted, freight to Chicago, 18 cents.

Angle Bars, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c	2.55c
1933	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
1932	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.65	2.65
1931	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1930	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1929	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1928	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1927	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1926	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1925	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1924	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1923	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1922	2.45	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.50	2.75	2.75	2.75
1921	2.75	2.75	2.75	2.70	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1920	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1919	3.00	3.00	3.00	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
1918	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.15
1917	2.25	2.25	2.35	2.75	2.95	3.25	3.45	3.25	3.25	3.25	3.25	3.25
1916	1.50	1.50	1.50	1.50	1.90	2.00	2.00	2.00	2.00	2.15	2.25	2.25
1915	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
1914	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50

Track Bolts, Chicago

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	3.55c	3.55c	3.55c	3.55c	3.55c	3.55c	3.55c	3.55c	3.55c	3.55c	3.55c	3.55c
1933	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.40	3.40	3.40	3.45	3.45
1932	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1931	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.70
1930	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1929	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1928	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
1927	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80	3.80	3.80
1926	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1925	3.90	4.00	4.00	4.00	3.95	3.90	3.90	3.90	3.90	3.90	3.90	3.90
1924	4.10	4.10	4.10	4.10	4.10	4.10	3.90	3.80	3.80	3.80	3.80	3.80
1923	3.90	4.05	4.15	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
1922	3.60	3.50	3.50	3.60	3.90	3.90	3.60	3.60	3.80	3.85	3.85	3.85
1921	5.00	5.00	5.00	4.85	4.75	4.45	4.40	4.15	3.65	3.65	3.65	3.60
1920	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.75	4.95	5.00	5.00	5.00
1919	4.90	4.90	4.90	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
1918	4.90	4.85	5.05	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10
1917	4.25	4.50	4.50	4.55	5.00	5.05	5.55	5.25	5.25	5.25	5.25	5.15
1916	2.60	2.65	3.20	3.25	3.25	3.25	3.25	3.25	3.25	3.60	4.20	4.25
1915	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.10	2.10	2.35	2.50
1914	2.05	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Structural Rivets, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	2.75c	2.75c	2.75c	2.90c	3.00c	3.00c	2.95c	2.90c	2.90c	2.90c	2.90c	2.90c
1933	2.25	2.25	2.25	2.25	2.25	2.35	2.50	2.50	2.50	2.60	2.75	2.75
1932	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25
1931	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.55	2.30	2.25	2.25
1930	3.10	3.10	3.10	3.10	3.00	2.90	2.90	2.75	2.75	2.75	2.75	2.75
1929	2.85	2.90	2.95	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
1928	2.75	2.75	2.80	2.90	2.90	2.90	2.90	2.85	2.80	2.80	2.80	2.80
1927	2.35	2.30	2.30	2.75	2.75	2.75	2.75	2.85	2.85	2.75	2.75	2.75
1926	2.55	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
1925	2.60	2.55	2.50	2.50	2.45	2.40	2.45	2.40	2.40	2.40	2.60	2.60
1924	2.85	2.75	2.75	2.65	2.60	2.55	2.50	2.50	2.55	2.60	2.60	2.60
1923	3.00	3.00	3.25	3.25	3.25	3.25	3.15	3.00	3.00	3.00	2.75	2.90
1922	2.25	2.00	2.00	2.05	2.20	2.35	2.40	2.45	3.00	3.00	3.00	3.00
1921	4.15	3.90	3.70	3.60	3.30	3.00	2.70	2.35	2.30	2.40	2.30	2.30
1920	4.15	4.40	4.50	4.50	4.50	4.50	4.50	4.50	4.60	4.75	4.75	4.50
1919	4.40	4.20	4.20	3.70	3.70	3.70	3.70	3.90	3.90	3.90	4.00	4.05
1918	4.65	4.65	4.65	4.65	4.60	4.40	4.40	4.40	4.40	4.40	4.40	4.40
1917	4.25	4.25	4.50	4.75	5.05	5.25	5.25	5.25	5.25	5.25	5.00	4.65
1916	2.60	2.75	3.10	3.35	3.90	4.25	4.05	4.00	4.00	4.00	4.10	4.25
1915	1.45	1.45	1.45	1.45	1.45	1.50	1.50	1.50	1.60	1.75	2.30	2.45
1914	1.60	1.60	1.60	1.60	1.60	1.55	1.50	1.50	1.55	1.50	1.45	1.45
1913	2.20	2.20	2.20	2.20	2.15	2.15	2.10	2.00	2.00	1.90	1.80	1.75

Cast Iron Pipe, New York

6-Inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$40.00	$40.00	$40.00	$40.00	$40.00	$40.50	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00
1933	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	34.00	34.50	38.60	40.00
1932	28.00	28.00	28.00	28.00	28.00	26.50	26.00	30.00	32.00	32.00	32.00	32.00
1931	38.10	37.50	37.50	37.50	37.75	34.50	33.70	32.00	28.50	29.10	29.00	28.00
1930	36.90	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50	38.50
1929	38.85	39.80	39.80	39.05	38.20	38.00	37.90	37.50	37.50	37.50	36.75	36.50
1928	37.15	36.75	36.75	37.25	37.65	38.25	28.08	37.60	37.60	37.10	37.20	38.60
1927	49.50	49.50	49.50	49.50	48.60	47.95	46.00	44.00	38.25	36.90	37.25	37.25
1926	51.50	51.50	51.50	52.75	51.50	51.50	51.50	51.50	51.50	51.50	51.50	51.50
1925	61.05	61.05	60.05	58.15	58.05	57.05	57.05	57.05	56.50	57.05	57.05	57.05
1924	66.10	66.10	66.10	66.10	66.10	65.10	65.10	64.10	64.10	64.10	62.10	60.60
1923	56.50	57.30	58.40	58.70	59.10	59.00	59.00	59.20	63.60	63.60	62.80	66.60
1922	47.30	47.30	47.60	48.80	48.80	49.80	53.30	54.50	55.30	55.30	55.30	55.30
1921	63.30	63.30	63.30	63.30	61.30	52.70	48.55	47.05	45.30	47.55	47.30	47.30
1920	67.30	70.30	71.30	73.30	76.30	76.30	76.30	76.30	77.20	77.20	77.20	77.20
1919	66.20	62.70	61.65	57.70	56.70	52.70	52.70	53.10	54.30	56.70	58.30	61.30
1918	55.35	55.35	55.35	55.35	56.55	61.35	62.30	62.50	62.70	67.50	67.50	67.70
1917	41.50	41.50	41.90	51.25	55.50	60.75	65.50	65.50	65.50	56.50	56.10	54.75
1916	29.00	29.40	29.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	34.50	41.00
1915	20.00	20.00	20.25	20.50	20.50	20.50	21.75	22.15	23.40	24.00	25.00	26.40

Cast Iron Pipe, Birmingham

6-Inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$36.00	$36.00	$36.00	$36.00	$36.00	$36.40	$38.00	$38.00	$38.00	$38.00	$38.00	$38.00
1933	32.00	32.00	32.00	32.00	32.00	34.25	35.00	35.00	35.00	35.00	35.25	36.00
1932	33.00	32.20	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
1931	37.00	37.00	36.50	35.00	35.00	35.00	35.00	35.00	33.00	33.00	33.00	33.00
1930	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
1929	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
1928	29.00	29.00	28.50	30.00	33.50	31.00	32.50	34.00	34.00	35.00	36.40	37.00
1927	36.00	36.00	36.50	36.00	36.50	34.80	34.00	30.75	29.80	28.75	29.00	29.00
1926	42.00	41.25	40.25	40.00	50.00	40.00	40.00	40.00	39.40	40.00	39.00	38.00
1925	40.00	40.00	40.00	39.60	38.50	40.00	40.00	41.00	41.00	41.75	42.00	42.00
1924	46.80	47.50	48.00	48.00	48.00	48.00	47.00	47.00	45.00	44.40	46.00	46.00
1923	43.00	45.00	45.50	46.75	49.00	49.00	49.00	49.00	49.00	49.00	49.00	51.00
1922	35.00	34.00	33.00	34.15	34.70	37.00	37.00	37.30	40.00	43.00	43.00	43.00
1921	55.00	55.00	55.00	55.00	55.00	42.50	40.00	39.50	38.00	36.50	32.50	35.00
1920	60.00	64.50	66.00	67.00	70.00	70.00	70.00	70.00	72.40	74.00	74.00	74.00
1919	58.75	55.00	54.50	53.00	52.00	48.00	48.00	48.00	48.00	50.00	53.00	56.70
1918	49.00	49.00	49.00	49.00	50.20	55.00	55.00	55.00	55.00	60.00	60.00	60.05
1917	36.00	36.00	37.40	42.40	47.20	55.00	55.00	55.00	55.75	47.25	45.00	46.00
1916	24.00	24.50	25.00	25.00	25.00	25.00	25.00	25.50	25.50	25.50	28.40	35.00
1915	19.50	19.50	19.50	19.50	19.25	18.65	19.00	19.00	19.40	20.75	21.90	22.65

Cast Iron Pipe, Chicago

6-Inch and Larger

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1934	$44.00	$44.00	$44.00	$44.00	$44.00	$44.80	$46.00	$46.00	$46.00	$46.00	$46.00	$46.00
1933	40.40	40.40	40.40	40.40	40.40	42.65	43.40	43.40	43.40	43.00	43.25	44.00
1932	40.40	38.80	38.40	34.40	34.40	34.40	34.40	34.40	38.90	40.40	40.40	40.00
1931	45.20	45.20	43.70	42.10	42.20	42.00	42.00	39.00	40.00	40.00	40.00	40.00
1930	44.40	45.20	45.20	45.20	44.00	43.20	44.80	45.20	45.20	45.20	45.20	45.20
1929	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20	45.20
1928	36.20	36.20	36.70	38.20	39.00	39.00	41.45	42.00	42.20	42.70	45.00	45.20
1927	45.70	43.70	44.00	44.20	43.20	42.80	42.20	38.95	36.20	34.30	35.30	35.30
1926	48.70	49.20	49.20	49.20	49.45	48.95	47.45	47.45	47.80	47.20	47.20	47.20
1925	49.00	50.20	48.20	46.10	46.95	47.95	48.20	49.20	49.45	49.20	50.20	50.20
1924	56.00	57.20	57.20	56.95	55.40	55.20	52.20	52.70	52.20	50.00	48.00	47.00
1923	51.20	53.20	53.70	55.20	57.20	57.20	59.20	60.45	59.20	57.95	56.85	59.20
1922	41.60	42.10	43.00	43.85	44.70	46.60	45.55	45.20	47.85	52.20	51.20	51.20
1921	64.10	64.10	64.10	64.10	64.10	51.50	47.60	44.35	42.90	42.60	42.60	42.60
1920	67.55	71.30	72.80	74.40	76.80	76.80	76.80	76.80	81.50	83.10	83.10	83.10
1919	64.30	61.80	60.55	56.80	54.80	51.80	52.60	54.80	55.80	59.80	59.80	63.80
1918	54.30	54.30	54.30	54.30	55.50	60.80	62.05	61.85	61.80	66.80	66.80	66.80
1917	41.00	41.50	43.70	52.50	55.50	60.75	65.50	65.50	65.50	57.75	52.10	53.50
1916	29.20	29.50	29.50	30.50	30.50	30.50	30.50	30.50	31.00	31.50	35.00	40.50
1915	23.40	23.00	23.00	23.00	23.00	23.00	24.00	24.00	24.70	25.75	26.90	27.90

Steel Ingot Production

Compiled by American Iron and Steel Institute

Gross Tons

	1920		1921		1922		1923		1924	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	3,524,026	130,519	2,517,042	96,809	1,891,857	72,764	3,841,095	142,263	3,649,913	135,182
February	3,401,760	141,740	1,998,705	83,279	2,071,772	86,324	3,471,843	144,660	3,826,246	153,050
March	3,916,960	145,073	1,794,777	66,473	2,814,667	104,247	4,066,680	150,618	4,206,699	161,796
April	3,132,458	120,479	1,386,897	53,342	2,902,240	116,090	3,963,736	158,549	3,348,466	128,787
May	3,423,178	131,661	1,446,181	55,622	3,218,794	119,215	4,216,355	156,161	2,640,034	97,779
June	3,538,971	136,114	1,146,350	44,090	3,127,775	120,299	3,767,256	144,894	2,065,676	82,627
July	3,327,785	127,992	917,824	36,713	2,952,806	118,112	3,531,458	141,258	1,877,789	72,223
August	3,562,411	137,016	1,300,199	48,156	2,629,256	97,380	3,695,788	136,881	2,552,891	98,188
September	3,561,365	136,976	1,342,092	51,619	2,818,261	108,395	3,356,776	134,271	2,827,625	108,755
October	3,580,873	137,726	1,847,139	71,044	3,410,265	131,164	3,577,091	132,485	3,125,418	115,756
November	3,132,891	120,496	1,896,483	72,942	3,430,309	131,935	3,134,321	120,551	3,121,149	124,846
December	2,778,714	106,874	1,630,395	62,707	3,300,416	132,017	2,863,266	114,531	3,569,251	137,279
Total	40,881,392	*131,030	19,224,084	*61,814	34,568,418	*111,511	43,485,665	*139,825	36,811,157	*117,984

	1925		1926		†1927		†1928		†1929	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	4,193,281	155,307	4,132,210	158,931	3,789,874	145,764	3,990,902	153,496	4,500,131	166,672
February	3,752,352	156,348	3,785,051	157,710	3,812,046	158,835	4,043,457	161,738	4,328,713	180,363
March	4,194,340	161,321	4,468,617	165,504	4,535,272	167,973	4,507,217	166,934	5,068,176	194,930
April	3,583,676	137,834	4,105,799	157,915	4,127,335	158,744	4,305,382	172,215	4,950,053	190,387
May	3,454,971	132,883	3,927,979	151,076	4,047,251	155,663	4,207,212	155,823	5,286,246	195,787
June	3,204,451	123,248	3,734,153	143,621	3,495,609	134,446	3,743,903	143,996	4,902,955	196,118
July	3,084,472	118,634	3,634,993	139,807	3,204,135	128,165	3,805,598	152,224	4,850,583	186,561
August	3,420,998	131,577	3,986,966	153,345	3,498,549	129,576	4,178,610	154,763	4,939,086	182,929
September	3,489,565	134,214	6,913,383	150,515	3,268,881	125,726	4,147,893	165,916	4,527,887	181,115
October	3,888,814	144,030	4,074,544	156,713	3,316,292	127,550	4,649,968	172,221	4,534,326	167,938
November	3,902,900	156,116	3,705,744	142,529	3,127,015	120,270	4,266,835	164,109	3,521,111	135,427
December	3,970,918	152,728	3,466,766	133,337	3,175,484	122,134	4,018,208	160,728	2,903,012	116,120
Total	44,140,738	*141,932	46,936,205	*150,920	43,397,743	*139,543	49,865,185	*160,338	54,312,279	*174,638

	†1930		†1931		†1932		†1933		†1934	
	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.	Total	Daily Av.
January	3,778,235	139,935	2,512,140	93,042	1,484,991	57,115	1,016,870	39,110	1,970,979	72,999
February	4,035,111	168,130	2,547,027	106,126	1,481,253	59,250	1,073,012	44,709	2,182,826	90,951
March	4,254,331	163,628	3,054,339	117,475	1,433,337	53,087	898,236	33,268	2,760,888	102,255
April	4,109,492	158,057	2,766,959	106,421	1,259,629	48,447	1,345,422	53,817	2,897,529	115,901
May	3,982,915	147,515	2,551,633	98,140	1,125,243	43,279	1,976,428	73,201	3,352,695	124,174
June	3,418,535	136,741	2,127,762	81,837	912,757	35,106	2,564,420	98,632	3,015,972	115,999
July	2,922,220	112,393	1,887,580	72,599	806,722	32,269	3,168,354	126,734	1,472,584	58,903
August	3,060,763	117,722	1,716,829	66,032	846,730	31,360	2,863,569	106,058	1,363,359	50,495
September	2,840,379	109,245	1,545,411	59,439	991,858	38,148	2,283,079	87,811	1,251,630	50,065
October	2,692,539	99,724	1,590,180	58,896	1,087,058	41,810	2,084,894	80,188	1,461,932	54,146
November	2,212,220	88,489	1,591,644	63,666	1,032,221	39,701	1,521,189	58,507	1,589,049	61,117
December	1,979,547	76,136	1,301,211	50,047	861,034	33,117	1,798,606	71,944	.....	.....
Total	39,286,287	*126,322	25,192,715	*81,006	13,322,833	*42,701	22,594,079	*72,884	‡23,319,443	*81,537

*Average. †Beginning with 1927, the Institute excludes crucible and electric ingots, which totaled 675,123 tons in 1927, 810,029 tons in 1928, 958,076 tons in 1929, 614,852 tons in 1930, 412,489 tons in 1931, 241,756 tons in 1932, and 421,884 tons in 1933. ‡Eleven months.

IRON AND STEEL COMPOSITE

Revised

An unweighted average of per-ton quotations on 25 iron and steel products, including 5 pig iron, 5 scrap, 3 semifinished steel and 12 finished steel products

1929

Monthly Averages

January	$35.94
February	35.96
March	35.98
April	36.40
May	36.53
June	36.46
July	36.33
August	36.36
September	36.20
October	35.85
November	35.60
December	35.43
Average for Year	36.09

1930

Jan. 1	$35.39
8	35.30
15	35.20
22	35.04
29	35.00
Average for January	35.19
Feb. 5	34.98
12	34.90
19	34.90
26	34.90
Average for February	34.92
Mar. 5	34.94
12	34.81
19	34.74
26	34.68
Average for March	34.79
April 2	34.28
9	34.22
16	34.19
23	34.13
30	33.99
Average for April	34.16
May 7	33.70
14	33.58
21	33.35
28	33.34
Average for May	33.49
June 4	33.38
11	33.30
18	33.26
25	33.19
Average for June	33.28
July 2	33.12
9	33.10
16	32.97
23	32.92
30	32.90
Average for July	33.00
Aug. 6	32.89
13	32.92
20	32.93
27	32.86
Average for August	32.90
Sept. 3	32.80
10	32.79
17	32.76
24	32.70
Average for September	32.76
Oct. 1	32.64
8	32.39
15	32.35
22	32.23
29	32.16
Average for October	32.35
Nov. 5	32.03
12	31.99
19	31.90
26	31.87
Average for November	31.95
Dec. 3	31.82
10	31.81
17	31.60
24	31.62
31	31.62
Average for December	31.69
Average for year	33.37

1931

Jan. 7	$31.63
14	31.71
21	31.72
28	31.70
Average for January	31.69
Feb. 4	31.66
11	31.66
18	31.62
25	31.61
Average for February	31.64
Mar. 4	31.60
11	31.61
18	31.72
25	31.65
Average for March	31.65
April 1	31.59
8	31.59
15	31.50
22	31.34
29	31.33
Average for April	31.47
May 6	31.21
13	31.00
20	30.98
27	31.09
Average for May	31.07
June 3	30.85
10	30.84
17	30.82
24	30.76
Average for June	30.82
July 1	30.78
8	30.83
15	30.79
22	30.76
29	30.75
Average for July	30.78
Aug. 5	30.75
12	30.75
19	30.74
26	30.69
Average for August	30.73
Sept. 2	30.62
9	30.63
16	30.61
23	30.60
30	30.61
Average for September	30.61
Oct. 3	30.39
10	30.33
17	30.30
24	30.26
31	30.21
Average for October	30.30
Nov. 7	30.20
14	30.20
21	30.17
28	30.08
Average for November	30.16
Dec. 5	30.00
12	29.97
19	29.89
26	29.74
Average for December	29.90
Average for year	30.90

1932

Jan. 2	29.60
9	29.56
16	29.76
23	29.70
30	29.62
Average for January	29.65
Feb. 6	29.25
13	29.24
20	29.24
27	29.22
Average for February	29.24
Mar. 5	29.23
12	29.23
19	29.21
26	29.45
Average for March	29.28
April 2	29.47
9	29.41
16	29.40
23	29.46
30	29.45
Average for April	29.44
May 7	29.39
14	29.36
21	29.29
28	29.30
Average for May	29.34
June 4	29.20
11	29.12
18	29.08
25	28.97
Average for June	29.09
July 2	28.95
9	28.91
16	28.83
23	28.83
30	28.83
Average for July	28.87
Aug. 6	28.67
13	28.76
20	28.81
27	28.84
Average for August	28.77
Sept. 3	28.90
10	28.91
17	28.96
24	28.96
Average for September	28.93
Oct. 1	28.97
8	28.97
15	28.96
22	28.81
29	28.79
Average for October	28.90
Nov. 5	28.81
12	28.80
19	28.77
26	28.77
Average for November	28.79
Dec. 3	28.32
10	28.28
17	28.26
24	28.26
31	28.26
Average for December	28.28
Average for year	29.05

1933

Jan. 7	$28.26
14	28.27
21	28.08
28	28.08
Average for January	28.17
Feb. 4	27.99
11	27.92
18	27.92
25	27.91
Average for February	27.94
Mar. 4	27.90
11	27.91
18	27.91
25	27.95
Average for March	27.92
April 1	27.71
8	27.74
15	27.77
22	27.80
29	27.90
Average for April	27.78
May 6	28.19
13	28.28
20	28.42
27	28.43
Average for May	28.33
June 3	28.46
10	28.75
17	28.77
24	28.85
Average for June	28.71
July 1	29.23
8	29.61
15	29.82
22	29.80
29	29.88
Average for July	29.67
Aug. 5	29.93
12	29.91
19	29.91
26	29.94
Average for August	29.92
Sept. 2	30.27
9	30.29
16	30.26
23	30.31
30	30.65
Average for September	30.36
Oct. 7	30.59
14	30.52
21	30.58
28	30.42
Average for October	30.53
Nov. 4	30.27
11	30.28
18	30.21
25	30.24
Average for November	30.25
Dec. 2	30.92
9	30.96
16	31.01
23	31.07
30	31.07
Average for December	31.01
Average for year	29.30

1934

Jan. 6	$31.10
13	31.13
20	31.17
27	31.20
Average for January	31.15
Feb. 3	31.21
10	31.30
17	31.33
24	31.34
Average for February	31.30
Mar. 3	31.36
10	31.43
17	31.42
24	31.34
31	31.34
Average for March	31.38
April 7	31.33
14	33.15
21	33.12
28	33.09
Average for April	32.67
May 5	33.03
12	33.00
19	32.94
26	32.89
Average for May	32.97
June 2	32.81
9	32.83
16	32.84
23	33.16
30	33.15
Average for June	32.96
July 7	32.38
14	32.33
21	32.28
28	32.28
Average for July	32.32
Aug. 4	32.28
11	32.23
18	32.23
25	32.22
Average for August	32.24
Sept. 1	32.17
8	32.17
15	32.14
22	32.13
29	32.13
Average for September	32.15
Oct. 6	32.09
13	32.09
20	32.09
27	32.12
Average for October	32.10
Nov. 3	32.13
10	32.13
17	32.15
24	32.18
Average for November	32.15
Dec. 1	32.22
8	32.25
15	32.44

For remainder of December see current market section.

STATISTICS OF IRON AND STEEL INDUSTRY

From department of commerce except shipments by U. S. Steel Corp., foundry equipment by Foundry Equipment Manufacturers association, river traffic by U. S. engineers at Pittsburgh, electric power by geological survey

U. S. Steel Corp.

Automobiles

1933	Production —United States— Total*	Passenger cars	Canada Total
Jan.	128,825	109,828	3,358
Feb.	105,477	89,976	3,298
March	115,272	96,809	6,632
April	176,432	149,344	8,255
May	214,411	180,597	9,396
June	249,727	207,562	7,323
July	229,357	191,261	6,540
Aug.	232,855	191,346	6,079
Sept.	191,800	157,367	5,808
Oct.	134,683	104,807	3,682
Nov.	60,683	40,754	2,291
Dec.	80,565	49,490	3,262
Year	1,920,057	1,569,141	65,924
1934			
Jan.	156,907	113,331	6,904
Feb.	231,707	187,639	8,571
Mar.	331,263	274,722	14,180
Apr.	354,745	289,030	18,363
May	331,652	273,765	20,161
June	308,065	261,852	13,905
July	266,576	223,868	11,114
August	234,809	183,500	9,904
Sept.	168,872	123,909	5,579
Oct.	132,488	84,503	3,780
10 Mo.	2,517,084	2,016,119	112,461

*Difference of total and passenger cars equals number of trucks.

Shipments

To consumers only, inter-company shipments not included

1933	Tons
Jan.	285,138
Feb.	275,929
March	256,793
April	335,321
May	455,302
June	603,937
July	701,322
Aug.	668,155
Sept.	575,161
Oct.	572,897
Nov.	430,358
Dec.	600,639
Year	5,805,235
1934	
Jan.	331,777
Feb.	385,500
Mar.	588,209
Apr.	643,009
May	745,063
June	985,337
July	369,938
August	378,023
Sept.	370,306
Oct.	343,962
10 Mo.	5,141,124

Fabricated Shapes

75-80 Per Cent of Industry Reporting

1933	Net Tons Bookings	Shipments
Jan.	73,679	50,965
Feb.	50,955	46,168
March	71,398	54,948
April	46,095	50,387
May	42,600	63,968
June	81,910	64,809
July	56,482	51,303
Aug.	78,379	67,913
Sept.	57,642	64,362
Oct.	53,695	73,139
Nov.	60,896	56,023
Dec.	83,799	56,388
Year	757,530	700,373
1934		
Jan.	74,358	46,774
Feb.	60,036	38,101
Mar.	82,250	50,685
Apr.	98,383	66,782
May	62,391	82,735
June	97,390	81,877
July	57,234	80,326
August	73,559	95,864
Sept.	48,701	80,869
Oct.	50,070	94,215
10 Mo.	704,372	718,228

Fabricated Plates

1933	Net Tons Bookings Oil Storage Tanks	Miscellaneous
Jan.	1,501	8,830
Feb.	8,347	7,660
March	1,270	6,787
April	2,938	6,291
May	2,858	8,183
June	20,894	14,013
July	6,013	11,417
Aug.	2,581	10,618
Sept.	1,033	13,602
Oct.	1,434	12,162
Nov.	3,734	9,466
Dec.	2,160	9,819
Year	55,025	119,569
1934		
Jan.	3,754	10,512
Feb.	2,476	10,452
Mar.	2,202	33,806
Apr.	2,998	13,447
May	8,746	10,802
June	11,019	13,642
July	2,028	7,901
August	3,334	10,855
Sept.	3,445	8,218
Oct.	927	11,437
10 Mo.	40,929	131,072

Foundry Equipment Order Index†

1933	
Jan.	68.4
Feb.	16.1
March	9.8
April	19.4
May	25.7
June	45.5
July	48.6
Aug.	56.2
Sept.	34.9
Oct.	42.46
Nov.	36.62
Dec.	43.2
Year	....
1934	
Jan.	37.2
Feb.	65.8
Mar.	75.4
Apr.	67.8
May	66.3
June	70.4
July	50.7
August	43.1
Sept.	46.4
Oct.	55.3
10 Mo.	....

†Average monthly shipments, 1922-23-24 taken as 100.

Malleable Castings

Net Tons

1933	Output	Shipments	Orders booked
Jan.	12,577	14,248	12,404
Feb.	13,575	14,068	11,077
March	9,756	10,967	12,380
April	17,871	16,666	17,856
May	24,628	23,077	24,671
June	31,118	29,268	31,997
July	30,865	29,155	28,458
August	31,811	30,195	28,323
Sept.	27,078	25,402	22,744
Oct.	24,381	20,422	19,933
Nov.	21,903	19,722	20,776
Dec.	21,870	22,300	26,305
Year	268,617	256,419	258,082
1934			
Jan.	30,417	26,642	32,501
Feb.	33,939	31,412	36,594
March	43,438	41,530	42,961
April	40,742	39,817	38,453
May	37,165	39,493	32,639
June	28,340	31,607	24,499
July	23,388	27,591	21,862
August	23,910	25,784	21,306
Sept.	21,541	20,360	19,511
Oct.	25,317	21,683	18,785
10 Mo.	308,197	305,919	289,111

Steel Castings

Net Tons

1933	Total bookings	Total production
Jan.	14,450	15,378
Feb.	13,179	13,802
March	13,178	14,896
April	15,942	13,492
May	22,612	20,751
June	34,965	29,455
July	31,878	31,718
August	31,502	33,834
Sept.	25,220	28,087
Oct.	26,135	27,826
Nov.	25,558	24,721
Dec.	25,612	23,718
Year	280,231	277,678
1934		
Jan.	26,296	27,644
Feb.	35,698	28,526
March	60,044	39,475
April	63,142	46,242
May	46,831	57,313
June	41,537	50,268
July	41,822	46,182
August	25,538	43,748
Sept.	20,030	31,816
Oct.	24,327	29,142
10 Mo.	385,267	400,372

Mech. Stokers

—Sales—

1933	Fire tube boilers	Water tube boilers
Jan.	55	13
Feb.	38	23
March	69	17
April	28	34
May	54	44
June	147	50
July	110	67
August	157	61
Sept.	175	28
Oct.	147	31
Nov.	142	40
Dec.	109	13
Year	1,231	421
1934		
Jan.	100	23
Feb.	49	25
March	62	43
April	48	39
May	110	35
June	117	52
July	121	68
August	183	49
Sept.	240	39
Oct.	229	44
10 Mo.	1,259	417

Steel Furniture

Dollars

1933	Business shipments	Shelving, shipments
Jan.	582,697	121,395
Feb.	464,256	104,264
March	482,086	137,670
April	404,854	133,782
May	511,838	166,957
June	636,045	165,946
July	522,624	156,244
August	693,089	178,688
Sept.	734,356	163,924
Oct.	825,462	146,087
Nov.	799,741	195,551
Dec.	1,040,077	199,810
Year	7,697,125	1,870,318
1934		
Jan.	993,473	210,205
Feb.	894,076	279,391
March	955,633	394,371
April	934,097	346,403
May	1,010,528	288,446
June	1,045,539	354,050
July	863,439	230,821
August	1,101,469	225,811
Sept.	879,243	260,545
Oct.	997,859	223,769
10 Mo.	9,678,721	2,819,049

Babbitt Metal

Pounds 000 omitted

1933	(a) Total production	(b) Sales
Jan.	1,346	1,073
Feb.	1,117	917
March	1,134	941
April	1,544	1,270
May	2,110	1,785
June	2,327	1,877
July	2,484	1,941
August	2,753	2,059
Sept.	2,419	1,800
Oct.	2,090	1,554
Nov.	1,963	1,606
Dec.	1,459	1,043
Year	22,812	17,876
1934		
Jan.	2,256	1,838
Feb.	2,147	1,715
March	2,474	1,976
April	2,527	1,964
May	2,425	1,889
June	2,261	1,618
July	1,988	1,435
August	1,856	1,399
Sept.	1,653	1,273
Oct.	1,807	1,364
10 Mo.	21,398	16,475

(a) by 40 plants. (b) by 30 manufacturers who produce for sale, including 5 who also report consumption of own metal.

Coke

Net Tons Production

1933	By-Product	Beehive
Jan.	1,784,527	81,900
Feb.	1,638,817	84,100
March	1,666,035	93,300
April	1,656,183	47,000
May	1,921,257	47,300
June	2,241,432	50,100
July	2,797,316	68,400
August	2,923,418	70,600
Sept.	2,712,050	59,500
Oct.	2,581,834	45,000
Nov.	2,334,597	92,800
Dec.	2,454,947	89,500
Year	26,722,400	829,500
1934		
Jan.	2,475,785	107,900
Feb.	2,493,494	129,100
March	2,968,573	161,400
April	2,875,451	71,600
May	3,191,869	63,200
June	2,989,875	61,100
July	2,381,459	50,700
August	2,279,672	43,700
Sept.	2,174,771	54,800
Oct.	2,316,858	75,800
10 Mo.	26,722,807	819,400

Electric Power

1933	Millions Kilowatt Hours Production*
Jan.	6,932
Feb.	6,285
March	6,674
April	6,462
May	6,996
June	6,231
July	7,479
August	7,686
Sept.	7,347
Oct.	7,478
Nov.	7,243
Dec.	7,447
Year	85,260
1934	
Jan.	7,631
Feb.	7,049
March	7,717
April	7,443
May	7,683
June	7,472
July	7,605
August	7,710
Sept.	7,199
Oct.	7,815
10 Mo.	75,324

*For public use.

Steel Barrels

Units

1933	Production	Shipments
Jan.	341,382	341,055
Feb.	311,111	312,919
March	427,562	425,682
April	452,086	454,794
May	531,304	531,921
June	643,982	640,596
July	623,056	621,042
August	537,801	527,811
Sept.	580,471	585,842
Oct.	873,536	863,277
Nov.	638,850	644,954
Dec.	610,440	610,365
Year	6,571,581	6,560,258
1934		
Jan.	708,086	706,209
Feb.	573,391	572,915
March	695,681	703,101
April	657,185	658,216
May	494,051	489,186
June	701,826	696,349
July	598,745	608,644
August	361,852	364,081
Sept.	412,592	417,114
Oct.	583,255	575,281
10 Mo.	5,786,742	5,791,234

River Traffic

Net Tons

1933	Allegheny	Monongahela	Ohio
Jan.	1,627	11,724	18,002
Feb.	1,656	17,904	23,614
March	425	19,546	32,917
April	3,025	35,795	37,191
May	4,400	39,890	46,038
June	815	58,179	56,484
July	3,900	68,453	62,096
August	3,234	67,389	69,531
Sept.	2,000	43,026	38,480
Oct.	4,240	39,026	49,047
Nov.	1,550	28,216	39,573
Dec.	4,130	38,693	51,038
Year	31,007	467,841	509,011
1934			
Jan.	590	27,158	54,109
Feb.	520	12,429	4,373
March	2,180	40,685	47,897
April	5,100	51,995	72,974
May	3,050	72,922	73,361
June	10,195	54,913	83,718
July	2,950	41,231	60,005
August	2,015	32,412	45,840
Sept.	3,750	35,411	45,848
Oct.	3,400	43,347	46,475
10 Mo.	33,750	412,503	534,600

Steel Boilers

New Orders

1933	Total	Units Stationary	Marine
Jan.	197	189	8
Feb.	176	162	14
March	195	186	9
April	236	228	8
May	328	307	21
June	511	496	15
July	498	491	7
August	511	441	70
Sept.	447	442	5
Oct.	395	377	18
Nov.	296	291	5
Dec.	328	310	18
Year	4,118	3,920	198
1934			
Jan.	249	239	10
Feb.	212	198	14
March	294	283	11
April	380	361	19
May	304	294	10
June	415	402	13
July	455	452	6
August	597	584	13
Sept.	626	594	32
Oct.	696	677	19
10 Mo.	4,231	4,084	147

Pig Iron Production

Coke and Anthracite Iron in Gross Tons; Annual Statistics by American Iron and Steel Institute, Monthly Statistics by STEEL

Year	Tons	Year	Tons	Year	Tons	Year	Tons	Year	Tons	Year	Tons
1885	3,687,522	1890	8,574,558	1895	9,220,967	1900	13,404,760	1905	22,639,452	1910	26,907,060
1886	5,273,010	1891	7,702,906	1896	8,311,833	1901	15,494,913	1906	24,874,184	1911	23,370,871
1887	5,900,914	1892	8,619,379	1897	9,397,469	1902	17,431,138	1907	25,343,964	1912	29,379,912
1888	5,955,105	1893	6,737,713	1898	11,477,184	1903	17,503,568	1908	15,686,872	1913	30,626,171
1889	7,028,374	1894	6,434,966	1899	13,335,937	1904	16,157,504	1909	25,419,468	1914	23,068,329

	Stacks No.	Stacks In	Output Total	Output Av. daily
1915				
Jan.	421	165	1,591,024	51,323
Feb.	421	179	1,666,592	59,521
March	421	190	2,046,280	66,009
April	421	197	2,114,518	70,484
May	421	207	2,255,157	72,747
June	421	221	2,369,932	78,998
July	421	234	2,563,311	82,687
Aug	421	246	2,774,825	89,510
Sept	420	266	2,834,342	94,478
Oct	420	276	3,120,340	100,656
Nov	421	285	3,035,235	101,174
Dec	421	295	3,201,605	103,278
Total			29,573,161	*81,022
1916				
Jan.	421	304	3,171,878	102,319
Feb.	421	312	3,078,548	106,157
March	422	315	3,327,630	107,343
April	422	320	3,225,496	107,517
May	423	321	3,364,584	108,535
June	423	325	3,213,818	107,127
July	419	316	3,221,127	103,907
Aug	419	317	3,197,838	103,156
Sept	419	326	3,208,041	106,935
Oct	419	328	3,508,180	113,167
Nov	420	322	3,317,805	110,593
Dec	422	309	3,184,178	102,715
Total			39,019,123	*106,609
1917				
Jan.	422	310	3,159,839	101,930
Feb.	422	317	2,649,935	94,641
March	423	331	3,255,813	105,026
April	425	333	3,328,061	110,936
May	425	340	3,413,677	110,119
June	427	347	3,260,234	108,675
July	429	351	3,337,442	107,659
Aug	431	357	3,238,970	104,483
Sept	431	342	3,140,742	104,691
Oct	433	354	3,296,286	106,332
Nov	434	344	3,198,597	106,620
Dec	435	321	2,885,380	93,077
Total			38,164,976	*104,561
1918				
Jan.	435	294	2,403,227	77,523
Feb.	435	319	2,318,242	82,723
March	438	338	3,209,996	103,548
April	437	351	3,273,355	109,112
May	437	360	3,451,884	111,351
June	437	353	3,316,148	110,538
July	437	364	3,408,584	109,954
Aug	438	371	3,378,479	108,983
Sept	438	364	3,413,223	113,774
Oct	437	364	3,482,392	112,335
Nov	437	360	3,347,844	111,595
Dec	435	351	3,434,114	110,778
Total			38,437,488	*105,308
1919				
Jan.	435	330	3,306,279	106,654
Feb.	435	311	2,943,347	105,120
March	435	279	3,088,023	99,614
April	435	216	2,474,374	82,479
May	433	197	2,107,729	67,991
June	433	199	2,114,028	70,467
July	434	240	2,424,212	78,200
Aug	432	266	2,742,081	88,453
Sept	433	163	2,480,790	82,692
Oct	432	216	1,864,424	60,142
Nov	432	252	2,407,369	80,244
Dec	432	262	2,626,074	84,711
Total			30,578,730	*83,777
1920				
Jan.	432	285	3,012,373	97,172
Feb.	432	305	2,984,257	102,904
March	433	315	3,375,768	108,895
April	433	278	2,752,670	91,754
May	433	297	2,991,825	96,510
June	433	302	3,046,623	101,553
July	434	291	3,043,918	98,190
Aug	434	306	3,145,536	101,468
Sept	434	317	3,124,308	104,143
Oct	435	290	3,288,341	106,075
Nov	435	255	2,935,081	97,836
Dec	435	202	2,700,268	87,105
Total			36,400,968	*99,456
1921				
Jan.	436	184	2,414,753	77,895
Feb.	436	155	1,929,394	68,906
March	436	103	1,594,866	51,447
April	436	96	1,190,751	39,691
May	436	90	1,215,272	39,202
June	436	74	1,064,007	35,466
July	435	69	864,642	27,892
Aug	436	69	954,901	30,802
Sept	435	84	985,795	32,859
Oct	435	95	1,234,450	39,821
Nov	429	120	1,414,958	47,165
Dec	429	123	1,642,775	52,992
Total			16,506,564	*45,223
1922				
Jan.	430	127	1,645,804	53,090
Feb.	429	139	1,630,180	58,220
March	429	155	2,035,908	65,674
April	429	161	2,070,161	69,005
May	427	175	2,309,348	74,495
June	427	191	2,362,455	78,748
July	427	170	2,403,030	77,517
Aug	427	143	1,810,665	58,408
Sept	427	189	2,024,008	67,466
Oct	428	218	2,629,655	84,827
Nov	428	241	2,846,110	94,870
Dec	428	253	3,083,520	99,468
Total			26,850,844	*73,563
1923				
Jan.	428	261	3,228,226	104,136
Feb.	424	278	2,993,918	106,925
March	424	295	3,523,595	113,664
April	423	311	3,546,308	118,210
May	423	322	3,868,486	124,790
June	424	322	3,667,868	122,262
July	418	299	3,684,677	118,860
Aug	418	270	3,448,886	111,254
Sept	418	254	3,117,526	103,917
Oct	418	245	3,142,646	101,375
Nov	418	229	2,891,191	96,373
Dec	418	231	2,912,527	93,952
Total			40,025,850	*109,659
1924				
Jan.	414	248	3,015,480	97,273
Feb.	414	263	3,073,619	105,987
March	410	269	2,465,389	111,787
April	410	234	3,226,107	107,537
May	411	187	2,619,986	84,515
June	411	158	2,022,836	67,427
July	411	145	1,783,457	57,531
Aug	411	150	1,882,986	60,741
Sept	411	174	2,053,617	68,454
Oct	411	182	2,461,727	79,410
Nov	411	204	2,514,979	83,832
Dec	411	229	2,956,389	95,367
Total			31,076,572	*84,908
1925				
Jan.	411	251	3,372,207	108,781
Feb.	411	256	3,214,067	114,788
March	410	246	3,571,422	115,207
April	409	221	3,211,235	107,041
May	405	196	2,933,907	94,642
June	399	191	2,679,045	89,301
July	396	188	2,665,262	85,976
Aug	391	192	2,707,171	87,328
Sept	387	200	2,725,885	90,862
Oct	386	209	3,017,889	97,351
Nov	385	220	3,023,257	100,775
Dec	385	234	3,249,057	104,808
Total			36,370,404	*99,645
1926				
Jan.	385	225	3,319,789	107,089
Feb.	382	223	2,923,850	104,423
March	377	235	3,458,171	111,554
April	376	237	3,438,805	114,627
May	376	229	3,477,820	112,187
June	372	220	3,232,478	107,749
July	372	217	3,224,663	104,021
Aug	372	215	3,200,723	103,249
Sept	372	216	3,163,269	105,442
Oct	374	218	3,334,206	107,555
Nov	375	216	3,237,992	107,933
Dec	369	203	3,089,175	99,651
Total			39,100,941	*107,126
1927				
Jan.	369	210	3,101,346	100,043
Feb.	369	217	2,940,604	105,021
March	365	223	3,482,107	112,326
April	364	221	3,424,377	114,146
May	363	211	3,391,067	109,388
June	362	198	3,089,726	102,991
July	362	190	2,954,625	95,311
Aug	362	189	2,950,674	95,183
Sept	362	181	2,782,500	92,750
Oct	361	174	2,812,015	90,712
Nov	359	171	2,661,863	88,728
Dec	354	169	2,698,208	87,039
Total			36,289,112	*99,422
1928				
Jan.	353	184	2,855,515	92,113
Feb.	353	186	2,898,668	99,954
March	350	197	3,199,175	103,199
April	349	195	3,181,975	106,066
May	345	199	3,292,790	106,219
June	343	189	3,082,340	102,745
July	342	185	3,072,711	99,120
Aug	340	183	3,136,995	101,193
Sept	340	194	3,063,593	102,120
Oct	338	196	3,373,539	108,824
Nov	337	194	3,304,656	110,155
Dec	335	198	3,369,784	108,702
Total			37,831,741	*103,365
1929				
Jan.	328	202	3,433,028	110,742
Feb.	326	208	3,218,376	114,942
March	326	213	3,709,518	119,662
April	326	216	3,663,167	122,106
May	325	220	3,898,344	125,753
June	325	220	3,715,104	123,837
July	325	217	3,782,511	122,016
Aug	325	209	3,746,198	120,845
Sept	323	204	3,496,454	116,548
Oct	318	203	3,588,146	115,747
Nov	317	176	3,182,420	106,081
Dec	316	156	2,836,917	91,513
Total			42,270,183	*115,808
1930				
Jan.	314	173	2,838,751	91,573
Feb.	314	180	2,845,937	101,640
March	314	184	3,252,822	104,930
April	314	182	3,191,119	106,371
May	314	180	3,241,477	104,564
June	312	162	2,934,508	97,817
July	312	144	2,638,441	85,110
Aug	312	137	2,525,105	81,455
Sept	310	126	2,276,781	75,893
Oct	310	111	2,165,374	69,851
Nov	310	107	1,865,458	62,182
Dec	310	95	1,665,715	53,732
Total			31,441,488	*86,141
1931				
Jan.	309	102	1,715,443	55,337
Feb.	307	109	1,711,192	61,114
March	307	116	2,028,906	65,448
April	307	113	2,009,582	66,986
May	307	105	1,995,001	64,355
June	303	91	1,637,998	54,599
July	303	82	1,462,270	47,170
Aug	303	75	1,279,205	41,264
Sept	303	74	1,168,436	38,947
Oct	303	69	1,172,781	37,831
Nov	302	67	1,101,820	36,727
Dec	301	57	980,377	31,625
Total			18,263,011	*50,035
1932				
Jan.	298	61	971,437	31,336
Feb.	298	64	960,550	33,122
March	298	60	967,015	31,194
April	297	59	855,734	28,524
May	297	54	783,769	25,282
June	297	47	626,015	20,867
July	297	45	570,222	18,394
Aug	297	41	528,105	17,035
Sept	295	46	593,640	19,788
Oct	292	50	644,648	20,795
Nov	292	51	625,753	20,858
Dec	291	42	547,179	17,650
Total			8,674,067	*23,699
1933				
Jan.	291	45	568,785	18,348
Feb.	291	44	553,067	19,752
March	291	38	542,013	17,484
April	291	48	623,606	20,786
May	290	61	892,326	28,784
June	289	90	1,264,953	42,165
July	289	105	1,801,345	58,108
Aug	289	98	1,833,265	59,137
Sept	289	89	1,507,931	50,264
Oct	289	81	1,358,540	43,824
Nov	289	77	1,083,740	36,124
Dec	289	74	1,192,136	38,456
Total			13,221,707	*36,223
1934				
Jan.	289	86	1,225,643	39,537
Feb.	289	90	1,270,792	45,385
March	289	97	1,625,588	52,438
April	285	109	1,736,217	57,873
May	284	117	2,057,471	66,370
June	283	92	1,936,897	64,563
July	282	74	1,228,544	39,630
Aug	282	61	1,060,187	34,199
Sept	282	61	899,075	29,969
Oct	282	65	951,353	30,689
Nov	281	60	957,906	31,930
	See Market Section			
Total			†14,949,673	*44,759

*Average. †Eleven months.

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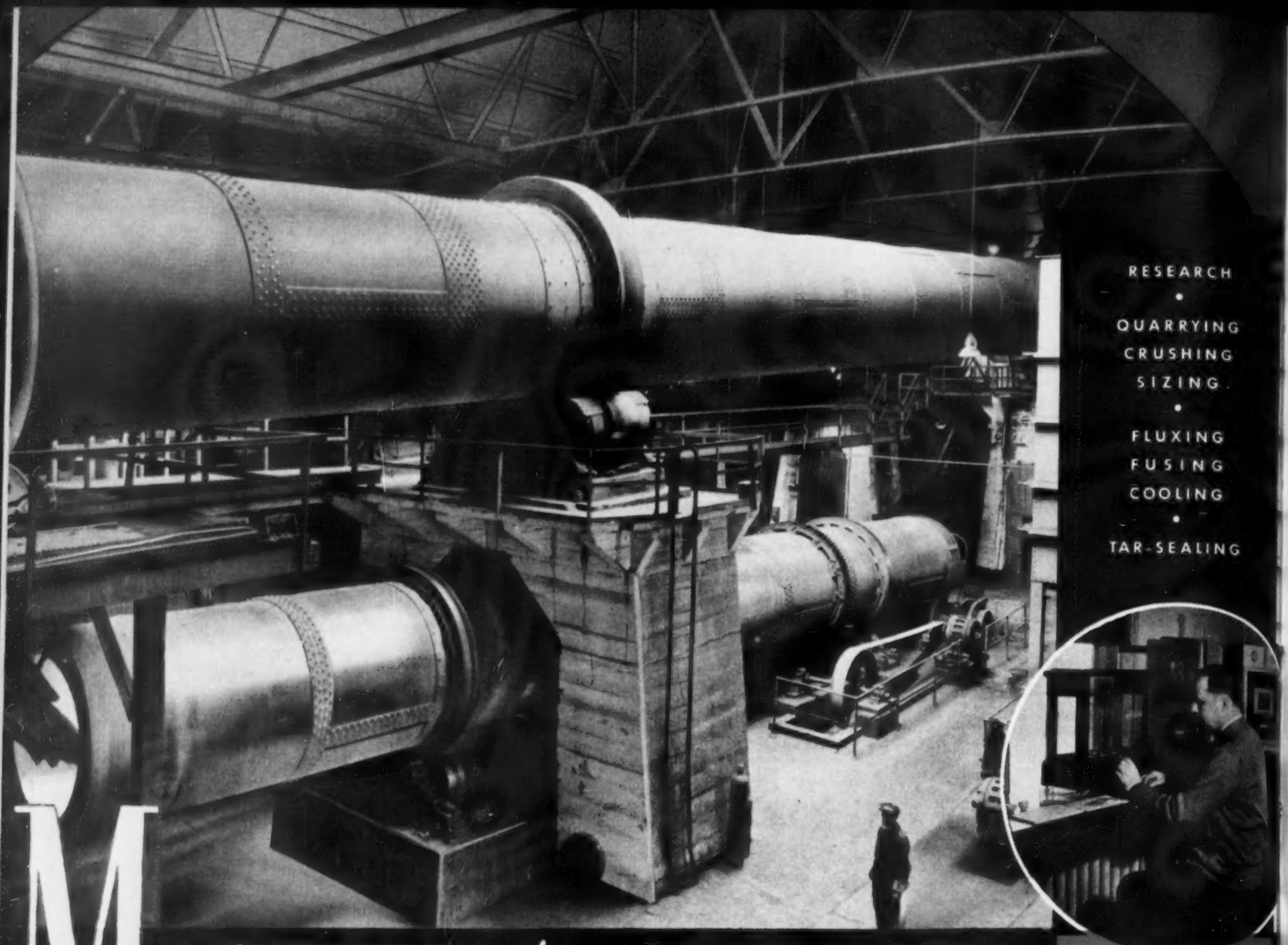

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New Year May Bring Improvement In European Conditions

BY VINCENT DELPORT,
European Manager, STEEL

TAKING a bird's-eye view of the European steel industry, it becomes apparent that 1934 may be looked upon as a year of transition, with a marked trend toward improvement. The total output of steel in Europe was about 25 per cent greater than in 1933; prices, both for domestic and export trade, showed a tendency to rise toward the end of the year; steelworks in general, thanks to more efficient organization and more economic operation, enjoyed a greater margin of profit. Not every country, however, participated in the revival, and the expansion of business was mainly due to increased activities in the various home markets.

Conspicuous among all other European nations, Great Britain seems to have emerged from the depression that had already begun to lift at the end of 1932. Stimulated by continued activities in the automobile industry, by gradual resumption of engineering and building construction, and even by increased demand from overseas markets, the British steel industry has taken full advantage of the protective tariff given it in 1932, and has taken the first vital steps toward reorganization, which was a condition attached to the maintenance of the tariff duties.

The improvement of British steel trade, at home and abroad, was practically uninterrupted throughout the past year, and prospects at the end of 1934 were definitely promising and pointed toward further expansion. At present, stocks of pig iron are limited and additional furnaces will doubtless have to be blown in to ensure adequate supplies to the steelmakers, who themselves are increasing their means of production.

In Germany increase of steel output was even more spectacular than in Great Britain, and was more than 50 per cent over the production of 1933. In that country, however, the additional supply of steel was almost entirely for home consumption, and was made possible by measures taken by the government to stimulate trade and reduce unemployment. While, with the exception of certain dark spots, the economic condition of Great Britain is considerably improved, the position in Germany gives rise to grave anxiety, particularly as regards the financial situation and the supply of raw materials that must be purchased from outside the country.

Only by mortgaging the income of the people for the next few years has it been possible to finance the schemes that have been conceived to create work. To some extent, Germany is living on capital and her position can only be strengthened by productive work and by the resumption of normal trade relations with other countries. Until these conditions are fulfilled the prospects of real revival remain painfully uncertain.

France is the only major producing country in Europe whose steel output actually decreased in 1934. While the country possesses vast stores of natural and acquired wealth, any tendency toward expansion of production and trade was arrested by a general feeling of insecurity, brought about by political unrest at home and by unfavorable reactions of certain disturbing events abroad.

A certain improvement may have been noticeable in the profits of the leading steel concerns, but this was due to the efforts made to reduce production costs and to the higher level of prices. On the other hand, due to the general atmosphere of uncertainty, the volume of domestic and

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export sales was not sufficient to keep the works operating at normal capacity.

With her potential resources, France could look forward to a revival of prosperity if she could acquire strong leadership, with greater unity and co-operation between the various sections of the population; and also if she could be free from the fear of disquieting factors from outside.

Conditions in Belgium and Luxemburg, although still unsatisfactory on the whole, were slightly better than in 1933, owing to a little more activity in export markets and more remunerative prices. The smaller concerns suffered most during the past year, and it would appear that only the fittest will survive and be able to enjoy the benefit of a return of trade when the opportune moment arrives. These two countries depend largely on export trade, and have to adapt themselves to the new conditions brought about by increasing difficulties in trading from one country to another, and also by increasing competition in markets that are gradually building up their own industry.

Other steel producing countries in Europe have generally been more active, and in most cases output showed an increase. Russia continues her forward movement and may soon be the largest producer in Europe.

The year 1934 was uneventful as regards the European steel entente and the various international and domestic selling syndicates. This year will probably be marked by interesting events, as many of these organizations will attain the end of their term.

While the interested parties are generally in agreement as regards the usefulness of these syndicates as factors of control and stabilization, it is likely that changes will be effected when the contracts come up for renewal, in order to satisfy claims on the part of some discontented members. Great Britain has as yet taken no active steps to join these European cartels, but signs point to the possibility of definite moves in that direction during the present year.

As the year begins, there are in Europe a number of difficult problems to solve, each of which is bound to influence the progress of trade. To take a wholly pessimistic view serves no good purpose, whereas hope, tempered with reason, is a strong incentive. At this time, one can hope that the obstacles may be safely surmounted and leave the path clear for progress. At the same time, there is a feeling that the world depression is gradually resolving itself, and if industry is given a chance of working out its own problems, a new era of sound prosperity may be in view before very long.

European Iron and Steel Export Prices, 1934

F. o. b. Ports of Shipment

British Prices in Pounds Sterling per Gross Ton, at Current Rate of Exchange

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry No. 3, Middlesbrough	2-18-6	2-18-6	2-18-6	2-19-0	3-0-0	3-0-0	3-0-0	3-0-0	3-0-0	3-0-0	3-1-6	3-1-6
Basic, Middlesbrough	2-14-0	2-14-0	2-14-0	2-14-0	2-14-0	2-14-0	2-14-0	2-14-0	2-14-0	2-14-0	2-15-0	2-15-0
Hematite, East Coast	3-0-0	3-2-6	3-4-0	3-2-6	3-1-6	3-1-0	3-0-6	3-0-6	3-0-6	3-0-6	3-2-0	3-2-0
SEMI-FINISHED STEEL												
Billets	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0
Wire rods	7-16-0	7-16-0	7-16-0	7-16-0	7-16-0	7-16-0	7-16-0	7-16-0	7-16-0	7-16-0	7-16-0	7-16-0
FINISHED STEEL												
Standard rails	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0	7-15-0
Merchant bars	7-0-0	7-5-0	7-5-0	7-10-0	7-10-0	7-10-0	7-10-0	7-10-0	7-10-0	7-10-0	7-10-0	7-10-0
Structural shapes	7-7-6	7-7-6	7-7-6	7-7-6	7-7-6	7-7-6	7-7-6	7-7-6	7-7-6	7-7-6	7-7-6	7-7-6
Plates, ship, bridge and tank	8-0-0	8-0-0	8-0-0	8-0-0	8-0-0	8-0-0	8-0-0	8-0-0	8-0-0	8-0-0	8-0-0	8-0-0
Sheets, black, 24-gage	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0
Sheets, galvanized, 24-gage, corrugated	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0
Hoops and bands	8-0-0	8-0-0	8-2-6	8-5-0	8-5-0	8-5-0	8-5-0	8-5-0	8-5-0	8-5-0	8-10-0	8-10-0
Plain wire, base	9-5-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0	9-5-0
Galvanized wire, base	11-0-0	11-10-0	11-10-0	11-10-0	11-10-0	11-10-0	11-0-0	11-5-0	11-5-0	11-5-0	11-5-0	11-5-0
Wire nails, base	12-0-0	12-0-0	12-0-0	12-0-0	12-0-0	12-0-0	12-0-0	12-0-0	12-0-0	12-0-0	12-0-0	12-0-0
Tinplate, base box 108 pounds	0-16-6	0-16-6	0-16-6	0-16-6	0-17-0	0-17-3	0-17-3	0-18-0	0-18-2	0-18-2	0-18-2	0-18-2
Ferromanganese	$84	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85

Continental Prices in Gold Pounds per Metric Ton

F. o. b. Channel or Northern Sea Ports

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
PIG IRON												
Foundry, Silicon 2.50-3.00	1-16-6	1-16-6	1-15-0	1-13-0	1-13-0	1-12-0	1-12-0	1-13-0	1-12-0	1-13-0	1-13-0	1-13-0
Basic bessemer	1-10-0	1-10-0	1-10-0	1-10-0	1-10-0	1-10-0	1-10-0	1-10-0	1-10-0	1-10-0	1-10-6	1-11-0
SEMI-FINISHED STEEL												
Billets	2-7-0	2-7-0	2-7-0	2-7-0	2-7-0	2-7-0	2-7-0	2-7-0	2-7-0	2-7-0	2-7-0	2-7-0
Wire rods	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0	4-10-0
FINISHED STEEL												
Standard rails	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0
Merchant bars	3-2-6	3-5-0	3-5-0	3-3-9	3-3-9	3-3-9	3-3-9	3-3-9	3-3-9	3-3-9	3-3-9	3-3-9
Structural shapes	2-17-6	2-17-6	3-0-0	3-0-0	3-1-6	3-1-6	3-1-6	3-1-6	3-1-6	3-1-6	3-1-6	3-1-6
Plates, 5 millimeters	4-2-6	4-2-6	4-2-6	4-2-6	4-2-6	4-2-6	4-2-6	4-2-6	4-2-6	4-2-6	4-2-6	4-2-6
Sheets, black, 24-gage, close annealed	5-19-0	5-19-0	5-18-0	5-18-0	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0	5-16-0	5-16-0	5-16-0
Sheets, galvanized, 24-gage, corrugated	7-5-0	7-0-0	6-10-0	6-15-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0	6-10-0
Hoops and bands	3-17-6	4-0-0	4-0-0	4-0-0	4-0-0	4-0-0	4-0-0	4-0-0	4-0-0	4-0-0	4-0-0	4-0-0
Plain wire, base	5-7-6	5-7-6	5-7-6	5-7-6	5-7-6	5-7-6	5-7-6	5-7-6	5-7-6	5-7-6	5-7-6	5-7-6
Galvanized wire, base	6-7-6	6-7-6	6-7-6	6-7-6	6-7-6	6-7-6	6-7-6	6-7-6	6-7-6	6-7-6	6-7-6	6-7-6
Wire nails, base	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0	5-15-0

Year of Steady Progress for Steel Made in Great Britain

BY J. A. HORTON,
British Correspondent, STEEL

A REMARKABLE feature of the trade position in Great Britain in 1934 was that while the rest of Europe suffered under the influence of political unrest, Britain pursued a steady progress and took a definite step toward recovering her position as the leading exporting country of the world.

Taking 1929 as the peak, there was a gradual shrinkage of exports in succeeding years, but this was arrested in 1934, as will be seen from accompanying statistics. A comparison over the first ten months will show how definite has been the upturn. Thus, exports for that period in 1934, totalled 1,847,317 gross tons, whereas in 1933 they reached only 1,565,583 tons, the increase for the past year being 18 per cent. Exports to British dominions, it may be noted, increased by about 10 per cent in value and by more than that in volume.

Home and Export Demand Grow

The principal outlets for British iron and steel exports in 1934 were as follows, January to October: to the Union of South Africa, 203,293 tons; to India, 173,647 tons; to Canada, 124,758 tons; to Australia, 122,713 tons; to Denmark, 96,212 tons; to China, 91,081 tons; to Argentine, 90,049 tons, to Russia, 74,693 tons; to New Zealand, 72,581 tons; to Holland, 67,594 tons. To the United States, only 6245 tons of British iron and steel products were exported.

Coupled with this improvement in export trade is the success achieved by the government in bringing about trade agreements as a means of overcoming tariff difficulties. The importance of export business to steel producers of the northeast coast is well known, and it is gratifying for them to find that iron and steel shipments from the Tees are now at their highest level since April, 1931.

Yet, Britain owes her improved industrial position far more to progress in the home market than in the export market. Export trade increased at the rate of more than two millions sterling a month in 1934, but at the same time the condition of the population was improved and many of the workless found employment.

The output of steel fluctuated as it did in 1933, but the monthly average was well above anything obtained in that year. The peak was reached in March, when 834,500 tons of steel ingots and castings were produced in British works. In August, the holiday month, production receded to 667,000 tons, but it increased in October to 812,000 tons. The average for the first ten months of the year was something like 744,000 tons, compared with a monthly average of 583,600 tons in 1933 and 638,600 tons in 1913.

In pig iron output there was a marked expansion, and close upon 100 blast-furnaces were in operation toward the end of the year, an increase of 25 over 1933, the result of a consistent rise from March, 1933, when the total number of furnaces operating was 65. Three new furnaces are being built, one in West Cumberland and two in Northamptonshire, and 24 furnaces are being relined or rebuilt.

In Northampton a great plan is in progress to provide a class of steel formerly imported. Two new blast furnaces have been built to produce basic iron, primarily for the mills of Stewarts & Lloyds Ltd., the originators of the project, where basic bessemer steel will be converted into tubes, etc.

Two furnaces are being built to replace old ones belonging to the Wellingborough Iron Co. Ltd. and this enterprise, which involves an expenditure of a quarter of a million sterling, is devoted to an enlarged production of pig iron for forge and foundry consumption. Equipment is provided for converting the furnace slag into roadmaking materials. The two furnaces combined will make about 2500 tons of pig iron per week.

The decision of the government, announced in June last, to continue the duty of 33 1/3 per cent on iron and steel without a time limit met with general approval. It should be recalled that the duty was introduced following the period 1929-1931, during which Continental steelmakers were capturing an ever growing share of the British market. Eventually the duties were extended by the import duties advisory committee, to expire in October 1934, and the committee asked for assurances from the industry that it was prepared to proceed with reorganization and bring it up to date in equipment.

It can be stated, without fear of contradiction, that reorganization is proceeding apace in all parts of the country, and with the knowledge that the duties have been extended *sine die*, the industry will be encouraged still further to see what can be done to bring down costs.

Unifying Factors Aid Recovery

At the end of last year, the newly-formed British Iron and Steel federation made further progress in organizing the national industry. An independent chairman was elected, and the post was given to Sir Andrew Duncan, formerly chairman of the electricity board. For the current year, the president of the federation is James Henderson, director of United Steel Companies Ltd. and of other iron and steel concerns, and vice president of the Iron and Steel institute. The director of the federation is Sir William J. Larke. On the strength of progress made in reorganizing the steel industry an application was made at the end of 1934 to the import duties advisory committee for raising of the import duty

British Business Progress in 1934

(Gross tons 000 omitted)

Monthly average	PRODUCTION Coal	Pig iron and ferro-alloys	No. fur-naces* in blast	Steel ingots and castings	IMPORTS Iron ore	Pig iron and ferro-alloys	Steel†	EXPORTS Furnace coke	Pig iron and ferro-alloys	Steel†
1913	23,951	855	338	639	603	18.0	168	...	93.7	320
1931	18,346	314	70	433	177	25.5	212	118	16.8	148
1932	17,437	298	60	438	147	12.8	120	114	10.7	147
1933	17,249	344	81	584	226	10.2	71	123	9.3	151
1934										
Jan.	20,758	441	85	711	289	14.9	105	139	9.8	154
Feb.	18,744	414	90	707	273	11.4	112	124	6.8	135
March	20,167	504	95	834	383	10.7	111	104	10.5	161
April	18,001	496	98	717	376	13.5	112	67	15.1	150
May	17,790	528	101	780	440	18.6	104	80	12.5	178
June	16,622	515	101	758	343	6.4	92	90	9.7	194
July	16,208	528	99	718	336	13.8	113	110	8.9	188
Aug.	17,133	503	97	667	382	13.6	89	154	13.9	180
Sept.	17,794	500	98	735	393	11.8	78	148	9.3	189
Oct.	19,544	527	97	812	251	16.3	104	119	13.0	208
Monthly average.	18,276	496	97	744	347	13.1	102	114	11.0	174

*Average for 1913; on last day of year or month for subsequent figures.
†Includes iron castings, but scrap excluded.

on foreign steel from 33 1/3 per cent to 50 per cent.

Another year has passed without any alteration in steel prices. Structural and shipbuilding material sell at the same rates as in 1929 when the Steel association fixed the basis. Galvanized sheets are a little dearer to the domestic consumer, but the overseas buyer pays exactly the same. Few branches of the British iron and steel trade are outside price control. Schemes are in existence which regulate the rates for practically all districts of the country.

The Central Pig Iron Producers association has mapped the country into zones and applied to each delivered prices correlated according to cost of transport from furnaces. In the spring of last year an increase of 5s a ton was made by this association, and shortly afterwards the Cleveland iron masters also agreed upon an advance of a similar amount. Since that time, no adjustment of major importance has taken place.

Prospects in the iron and steel industry as a whole may be taken as encouraging. There has been a marked revival of shipbuilding on the Clyde and at other ports during 1934. When the launch of the QUEEN MARY took place it was announced that a sister vessel would almost certainly be built soon.

Output was much heavier in 1934 than in the previous year, and this augurs well for British steelmakers. The automobile industry was almost prosperous. Financial returns of the leading iron and steel concerns were much improved, and shares went up. It is a fact that the British domestic market continues to demand and absorb an output almost as large as the peak year of steel production (1929).

The misfortunes and visitations of other countries curiously enough have benefited the sheet trade. A year ago the Argentine order for 22,000 tons of locust sheets occasioned a small boom in the galvanized sheet trade. Quite recently some sheetmakers received substantial contracts from Australian buyers, owing to labor troubles in that country, while consignments of sheets have been ordered to replace and rebuild property damaged in the Japanese typhoon.

In the case of the Australian purchases, which amounted to about 12,000 tons, they were to be admitted free of duty provided they arrived in

(*Please turn to Page* 258)

European Iron and Steel Domestic Prices, 1934

At Works or Furnace

British Prices in Pounds Sterling per Gross Ton, at Current Rate of Exchange

	Jan. £ s d	Feb. £ s d	March £ s d	April £ s d	May £ s d	June £ s d	July £ s d	Aug. £ s d	Sept. £ s d	Oct. £ s d	Nov. £ s d	Dec. £ s d
Foundry pig iron, Silicon 2.50-3.00*	3- 2-6	3- 7-6	3- 7-6	3- 7-6	3- 7-6	3- 7-6	3- 7-6	3- 7-6	3- 7-6	3- 7-6	3- 7-6	3- 7-6
Basic pig iron*	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 5-0	3- 6-3	3- 7-6	3- 7-6	3- 7-6	3- 7-6
Furnace coke	0-17-0	0-18-0	0-17-6	0-17-6	0-17-6	0-17-6	0-17-6	0-17-6	0-17-6	0-17-6	0-17-6	0-17-6
Billets	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0	5-10-0
Standard rails	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0	8- 5-0
Merchant bars	7-12-6	8-12-0	8-12-0	8-12-0	8-12-0	8-12-0	8-12-0	8-12-0	8-12-0	8-12-0	8-12-0	8-12-0
Shapes	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0	8-15-0
Plates, ship, bridge and tank	8-11-3	8-12-6	8-17-6	8-17-6	8-10-0	8-10-0	8-10-0	8- 8-9	8- 8-9	8- 8-9	8-15-0	9- 1-3
Sheets, black, 24-gage	10- 5-0	10- 5-0	10- 5-0	10- 5-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0
Sheets, galvanized, 24-gage, corrugated	12-15-0	12-15-0	12-15-0	12-15-0	13- 0-0	13- 0-0	13- 0-0	13- 0-0	13- 0-0	13- 0-0	13- 0-0	13- 0-0
Plain wire	9- 5-0	9-15-0	9-15-0	9-15-0	9-15-0	9-15-0	9- 5-0	9- 5-0	9- 5-0	9- 5-0	9- 5-0	9- 5-0
Hoops and bands	10-10-0	10-10-0	10-10-0	10-10-0	10-10-0	10- 0-0	9- 7-0	9- 7-0	9- 7-0	9- 7-0	9- 7-0	9- 7-0

*Delivered Middlesbrough.
Rebates of 15s. per ton for sections and plates, and 22s. 6d. for beams, are obtainable in the Home Trade under certain conditions.

German Prices in Reichsmarks per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry pig iron, Silicon 2.50-3.00	63	63	63	63	63	63	63	63	63	63	63	63
Hematite pig iron	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50	69.50
Furnace coke	19.25	19.25	19.25	19	19	19	19	19	19	19	19	19
Billets	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50
Standard rails	132	132	132	132	132	132	132	132	132	132	132	132
Merchant bars	110	110	110	110	110	110	110	110	110	110	110	110
Shapes	107	107	107	107	107	107	107	107	107	107	107	107
Plates, 5 millimeters	127	127	127	127	127	127	127	127	127	127	127	127
Sheets, black, 1 to 3 millimeters, basis	144	144	144	144	144	144	144	144	144	144	144	144
Sheets, galvanized, 24-gage, corrugated	370	370	370	370	370	370	370	370	370	370	370	370
Plain wire	173	173	173	173	173	173	173	173	173	173	173	173
Hoops and bands	127	127	127	127	127	127	127	127	127	127	127	127

French Prices in French Francs per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry pig iron, Silicon 2.50-3.00	190	190	190	190	210	210	210	210	210	210	210	210
Basic bessemer pig iron	185	185	185	185	185	185	185	185	185	185	185	185
Furnace coke	120	120	120	120	120	120	120	120	120	120	120	120
Billets	430	430	430	430	430	430	430	430	430	430	430	430
Standard rails	700	700	700	700	700	700	700	700	700	700	694	694
Merchant bars	560	560	560	560	560	560	560	560	560	560	560	560
Shapes	550	550	550	550	550	550	550	550	550	550	550	550
Plates, 5 millimeters	700	700	700	700	700	700	700	700	700	700	700	700
Sheets, black, 2 millimeters	850	850	850	850	850	850	850	850	850	850	850	850
Sheets, galvanized, 0.6-millimeter, cor.	1450	1450	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Plain wire	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1090	1050
Hoops and bands	650	650	650	650	650	650	650	650	650	650	650	650

Belgian Prices in Belgian Francs per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Foundry pig iron, Silicon 2.50-3.00	295	295	295	295	300	310	310	310	310	310	310	310
Basic bessemer pig iron	290	295	285	290	290	290	290	290	285	285	275	275
Furnace coke	110	110	110	110	110	110	110	110	110	110	110	110
Billets	440	440	440	440	440	440	440	440	440	440	440	440
Standard rails	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Merchant bars	550	550	550	550	550	550	550	550	550	550	550	550
Shapes	550	550	550	550	550	550	550	550	550	550	550	550
Plates, 5 millimeters	700	700	700	700	700	700	700	700	700	700	700	700
Sheets, black, 1 to 3 millimeters, basis	775	775	775	775	775	775	775	775	775	775	775	775
Galvanized sheets, corrugated, 0.5-milli.	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Plain wire	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Hoops and bands	700	700	700	700	700	700	700	700	700	700	700	700

Political Uncertainties in France Hinder Steel Trade

BY LEON JAUDOIN,
French Correspondent, STEEL

THE FRENCH iron and steel industry had reached the end of the year 1933 without too much damage. In 1934, thanks to the operation of comptoirs, or selling syndicates, domestic prices were maintained at a reasonable level both for consumers and suppliers. On the other hand, balance sheets of the leading concerns proved to be strictly balanced, and, generally speaking, distributions of profit were scarce or relatively unimportant.

While many efforts were made by iron and steel manufacturers to organize their production and increase their outlets, it was not possible to overcome lack of confidence, the origin of which was purely political. It can be said that each time a gleam of hope appeared, indicating some tendency toward an improvement, some political event occurred that dashed such hope to the ground.

Confidence Meets Severe Blows

At the beginning of 1934 there was street fighting in Paris, and the serious crisis which then developed was only stopped by President Doumergue coming into power. Before confidence had really started to be restored, a series of events occurred in Germany at the end of June and in Austria in July; and in October, the assassination of the king of Yugo-Slavia, with its political consequences, also helped to unnerve business. Up to the end of the year, political uncertainty exerted its unfavorable influence on business. Under this constant strain, consumers were led to limit purchases and live on existing stocks.

From an economic aspect, the French government appears to have no other alternative than to maintain its policy of rationing imports. There remains, therefore, a considerable margin between export and domestic prices, due to restrictions put against imports, whether due to quotas or because, owing to international agreements covering exchange of iron and steel products, restrictions are imposed upon delivery of steel commodities in the respective territories of the members of the international steel entente.

The official number of unemployed persons for all trades in France Jan. 1, 1934, was 320,273, against 284,347 Jan. 1, 1933. At the end of October, the number of unemployed persons was 339,822, an increase of 108,067 over the figure for October.

A large number of works operated at a reduced capacity, and order books were depleted, notwithstanding price concessions to attract business in France as well as in foreign markets. France's balance of trade is adverse and the adverse balance at the end of the first nine months of 1934 was 4,594,209,000 francs, although there was a slight improvement at the end of the year.

The output of steel products controlled by the comptoirs for the first nine months of the year was as follows:

	Domestic market	Export market
	Metric tons	
Semifinished steel	327,339	277,329
Structural steel	194,452	175,344
Merchant steel	515,238	162,111
Plates	135,535	18,361
Medium-gage sheets	87,036	5,824

Although there were a few reductions in wages during the year, there were no serious labor troubles. On the other hand, the cost of living remained high; and although the government attempted measures to reduce prices, results were hardly appreciable, partly owing to the strong measures adopted to support agriculture. It is true that wholesale prices diminished, but retail prices did not follow the same trend. The position as regards the country as a whole is, therefore, unsatisfactory, and there is further necessity for reducing production costs.

It is generally believed that if the comptoirs, or selling syndicates, were not in existence, the position of the French iron and steel industries would be so competitive as to make the position intolerable. Prices would have been cut to such an extent that heavy losses would have been incurred by most producers.

Comptoirs Face Adjustments

Actually, meetings of the Comptoir Siderurgique throughout the year were held in an atmosphere of goodwill, and the various syndicates functioned without any important events having to be recorded. This does not mean to say that all members of these comptoirs are satisfied, since some works are in such a position that they have certain advantages over the others. Actually, the date of expiration of most of the comptoirs is June, 1935, and already some thought is being given to the question of renewal.

It is expected that a number of works will request certain changes in existing contracts; and while it is believed that everyone wishes for the renewal of these syndicates, it is not likely that many works will agree unless material changes are made. A foretaste of what is likely to happen is afforded by the protracted negotiations concerning the renewal of the light-gage sheet comptoir, which came to expiration at the end of the year.

The phosphorus pig iron comptoir, which handles all gray iron sales, was organized for a period of one year, dating from July 1, on the un-

French Business Progress in 1934

(Metric tons 000 omitted)

Monthly average	PRODUCTION* Iron ore	Coke†	Pig iron and ferro-alloys	No. fur-‡ naces in blast	Steel ingots and castings	IMPORTS° Coke	Pig iron and ferro-alloys	Steel§	EXPORTS° Pig iron and ferro-alloys	Steel§
1913	3,588	336	756	195	581	256	4.2	10	9	51
1931	3,213	377	683	90	652	283	7.4	20	36	255
1932	2,300	277	461	81	470	164	3.7	14	17	183
1933	2,518	320	527	91	544	184	8.1	17	15	208
1934										
Jan.	2,660	358	526	91	518	186	6	17	15	204
Feb.	2,446	327	474	91	477	190	8	16	13	239
March	2,736	353	526	89	528	189	6	16	16	231
April	2,557	329	503	88	501	203	7	14	18	270
May	2,697	335	527	87	533	182	4	9	16	250
June	2,714	332	509	86	512	188	7	13	12	264
July	2,639	340	511	85	513	176	4	8	15	239
Aug.	2,748	343	532	84	533	183	5	12	13	272
Sept.	2,617	330	499	84	494	170	6	7	15	266
Oct.	2,819		530	86	530	170	3	7	11	255
Monthly average	2,663		514	86	514	184	5.6	12	14	249

*Production for 1913 is for France in her present boundaries.
†Coke production at the coal mines. In addition, the iron and steel works produce about 3,500,000 tons annually.
‡On last day of year or month.
§Includes ingots, semifinished steel, all rolled products, forgings and scrap.
°Import and export figures are inclusive of the Saar district, except in 1913.

derstanding that it would be dissolved if the hematite pig iron comptoir were not organized by Nov. 1, 1934. The organization of this latter comptoir was the object of difficult negotiations which were carried on practically throughout the year, and at the time of writing this report, it is hoped that the fall of prices will incite producers to agree to the necessary concessions.

The organization of the warehouse and retail trade was proceeded with as far as possible; but in the Paris region in particular, the fixed prices, especially those of reinforced concrete bars, were not always adhered to, and the advisability of further control and fixing of quotas for each merchant firm is being discussed.

Generally speaking, however, the various syndicates have found it possible to strengthen their control, and few infractions were registered, at least so far as the more important syndicates were concerned. An unfavorable position was created by the Saar manufacturers, who are alleged to have offered tonnages of wire rod and bars at prices below those fixed by the comptoirs.

Prices Fluctuated Little

Export selling syndicates contracted for tonnages up to the limits allocated to them. Important orders were received from Russia, following a commercial agreement signed between France and Russia and facilities offered to Russia for financing of these contracts.

There were few fluctuations in domestic prices in 1934, and the following prices prevailed: blooms, 400 francs per metric ton; billets, 430 francs; beams, 550 francs; wire rod, 715 francs. Merchant bars were quoted at 560 francs up to April, when the price was raised to 600 francs, with a rebate of 40 francs to members of sales syndicates. Plates were quoted at 680 francs at the beginning of the year, and the price was then raised to 700 francs. Light-gage sheets were sold at 850 francs, and sheet bars at 600 francs. All these prices are for basic bessemer steel.

The price of foundry pig iron fluctuated between 200 francs in January, 180 francs in April and up to 210 francs at the end of the year. Hematite for steelmaking was sold at 335 francs, and ferromanganese at 760 to 800 francs.

This general stability in prices is due to the comptoirs; but while prices were well maintained, the output of French iron and steel works was reduced, as can be seen from the statistical tables.

The government attempted to assist the industry in this grave crisis by appropriating certain sums for realization of a scheme of public works. In addition, the construction of fortifications on the northern and southeastern frontiers has created a certain demand for steel products; but while these factors are of interest to the industry, they do not go to the root of the trouble so far as lack of business is concerned.

Industrial activity in France will depend to a large extent upon the policies of the government, and the present state of instability can only bring about further disillusionment. Until France has a strong government at its head, the future will remain uncertain.

The position is further complicated by the impending change in the situation of the Saar and the effects of the plebiscite in January. The steel industry is primarily interested in this question, for a number of French steel concerns own or control important interests in the Saar, and it is almost certain that the existing agreement between the Saar works and France, under which 500,000 tons of Saar products can be sold into the French market annually, will be modified.

It will be seen that as the French steel industry enters 1935 the position generally is unfavorable and that immediate prospects are not particularly bright; and with the materialization of the Saar problem, the necessity for renewing the comptoirs toward the middle of the year, and possible legislative elections, the outlook is the reverse of hopeful.

Central Europe Emerging From Effects of Depression

BY DR. JAN TILLE,
Special Correspondent, STEEL

FURTHER progress in production of steel was noticeable in Central Europe during 1934. This development, however, was not the same everywhere; it depended to a great extent on the situation peculiar to each individual country.

In Czechoslovakia output of raw steel showed considerable increase. From the low point, in 1932, when only 670,000 metric tons were produced, production rose to 750,000 tons in 1933, and in the first ten months of 1934, 817,000 tons were produced, equivalent to 985,000 tons for the year. Domestic sales increased by about 10 per cent, while exports increased by no less than 50 per cent, largely due to the measures taken by the government in reducing the value of the Czechoslovak currency by 16 2/3 per cent in comparison with the previous year's rate of exchange.

Exports to Russia again improved during the last months of the year, and a further favorable development is expected as a result of Czechoslovakia having recognized Soviet Russia. A commercial treaty with Russia is now being negotiated.

In the course of 1934, Czechoslovakia became a member of the European steel entente, and the following quotas were allocated: plates, 8.764 per cent; medium-gage sheets, 5.877 per cent; rolled steel, 2.451 per cent. Czechoslovakia is also considering joining the tinplate syndicate if certain difficulties can be overcome.

The effects of the act that came into force in Czechoslovakia Nov. 1, 1933, to govern the powers invested in the various cartels, have not yet become apparent in actual practice. Efforts of the government to force down prices of industrial products are rendered difficult by demands of the agrarians for raising prices of agricultural products. Prices of iron and steel remained unchanged in 1934. The tonnage of rolled material exported by Czechoslovakia in 1933 was 16 per cent of the total output, whereas in 1934 the proportion of exports amounted to 21 per cent.

Except for Russia, the chief outlets for Czechoslovak products are the Balkan states, but business with these countries is rendered difficult by numerous restrictions governing the amount of foreign currency available, while payment can only be obtained by utilizing special clearing arrangements; and, in addition to this, sales are possible, in most cases only on a system of international barter.

Austria Makes Steady Gains

In Austria, the worst of the depression was in 1932, when the output of raw steel was 210,000 metric tons. In 1933, output reached 226,000 tons, and the first nine months of 1934 showed a total production of 230,000 tons, equivalent to 250,000 tons for the year.

In Hungary, production of steel during the first ten months of 1934 showed only little improvement. Export trade was, on the whole, better as regards quantity.

Austria is now a member but Hungary has not yet become a member of the European steel entente.

Poland, which is neither a member of the European steel entente nor of the international railmakers associ-

ation, is in an exceptional position, especially with regard to export business. Poland's steel industry continues to receive from the government an export premium, which facilitates export business.

The lowest point in the production of steel was reached in 1932 with 550,000 metric tons. Output increased to 818,000 tons in 1933, and for the first ten months of 1934 it amounted to 710,000 tons, or about 850,000 tons for the year. In respect of deliveries to Russia, Polish works have the advantage of their geographical position and of the possibilities of compensation; they purchase iron ore from Russia against a certain tonnage of finished steel exported to that country.

Russian Production Growing

In Russia, production of raw steel has been steadily increasing. The output in 1931 was 5,416,000 metric tons; in 1932 it increased to 5,900,000 tons, and in 1933 it had already risen to 6,650,000 tons. The first half of 1934 yielded an output of 4,490,000 tons, and the total production of raw steel for 1934 can be estimated at about 9,800,000 tons. During the past year the Russian production program was carried out to within 90 per cent of the results planned.

Russian imports, on the other hand, are gradually growing smaller, and business in rails, for instance, has now completely ceased. Russian iron and steel imports are mainly from Poland and, recently, from France also, the latter country having now accepted the terms of credit (21 months and 5½ per cent interest) which had previously been granted to Russia by other suppliers. Czechoslovakia exported 9500 tons of rolled products to Russia in 1934, mostly plates and spring steel.

A further increase in Russia's production figures in 1935 is expected, both for pig iron and steel.

Marked Rise in Germany's Steel Production and Sales

European Staff Special

DURING 1934 the increase of German steel production and sales, which began about the middle of 1932, continued up to August, when a slight slowing down set in, partly due to seasonal causes. Pig iron output, which already in 1933 had increased by 35 per cent, is estimated to have expanded further in 1934 by 60 per cent, to 8,500,000 metric tons. Production of raw steel grew by about 50 per cent, against 33 per cent a year before, from 7,586,000 metric tons in 1933 to about 11,500,000 tons.

This improvement was to a large extent due to the government's policy of establishing and subsidizing large schemes of work and to the various financial and taxation measures taken to stimulate industrial activity, in the hope that eventually private enterprise would replace the intervention of the government. Normal replacement of stock, postponed for many years, also must be mentioned as a cause of the revival of domestic business.

Altogether, the government scheduled to spend upon recovery work 5,400,000,000 Reichsmarks, of which amount, at the end of 1934, about 3,000,000,000 Reichsmarks had been paid out by issuing a corresponding amount of recovery bills. Of these amounts, approximately 2,000,000,000 Reichsmarks have been financed by the central German note-issuing bank (Reichsbank), whereas the balance is mainly held by bankers and industrial undertakings investing their liquid funds in these bills. These bills will have to be redeemed during the next four years, and the public income is mortgaged correspondingly.

This expansion of credit, and the agricultural policy of the government that aims at raising German farm prices, has resulted in advancing the general level of domestic prices during a period when world market prices continued to decline.

It is not astonishing to see that these developments resulted in increasing German domestic consumption of all raw materials and primary products, including iron and steel, and attracted imports of foreign commodities, while at the same time an unfavorable reaction set in against Germany's exports. These developments give the principal reasons for the difficulties of the German foreign exchange situation, which constituted the outstanding feature of the whole of Germany's economic life in 1934.

German Exports Are Larger

Notwithstanding these conditions, the German iron and steel industry, for the first time for many years, succeeded in increasing its exports to 2,146,440 metric tons, including scrap, during the first ten months of 1934, compared with the low record of 1,746,248 tons a year previously.

This was possible only at the cost of considerable price concessions, although the German steel industry benefited, to a certain extent, from operation of the international raw steel export association and from the system of state export subsidies.

This is clearly reflected by contraction in value of iron and steel exports. The increase in volume of exports was the more noteworthy in view of the fact that sales to Russia, which in 1933 played the principal part in foreign sales, subsided materially in 1934.

It may appear strange, at first sight, that imports of iron and steel also substantially increased, despite Germany's foreign exchange difficulties. During the first nine months of 1934, imports aggregated 1,478,932 metric tons, valued at 160,816,000 Reichsmarks, against only 960,574 tons, valued at 104,690,000 Reichsmarks during the corresponding period of 1933.

This rise in imports was mainly due to purchases in the Saar district and Belgium, and to a small extent to purchases of cheap rolled material

German Business Progress in 1934

(Metric tons 000 omitted)

Monthly average	PRODUCTION* Coke	Pig iron and ferro-alloys	No. fur-† naces in blast	Steel ingots and castings	IMPORTS‡ Pig iron and ferro-alloys	Steel§	EXPORTS‡ Coke	Pig iron and ferro-alloys	Steel§
1913	2,639	910	204	993	11.0	41	534	71	470
1931	1,932	505	47	691	9.9	68	528	16	345
1932	1,594	328	42	481	5.3	61	432	.6	201
1933	1,726	439	48	632	6.3	101	448	9.6	169
1934									
Jan.	1,969	543	51	817	7.7	81	586	8.5	192
Feb.	1,813	550	50	823	6.2	124	463	9.1	203
March	1,961	650	62	930	8.8	157	462	12.4	197
April	1,939	697	63	977	10.7	182	381	11.7	182
May	2,038	737	65	989	9.1	170	428	12.7	191
June	1,956	718	66	1,003	7.6	160	458	14.3	200
July	2,030	767	71	1,036	6.7	173	511	14.5	198
Aug.	2,039	799	71	1,068	8.9	170	555	13.5	196
Sept.	2,005	776	70	976	10.1	187	593	15.1	227
Oct.	2,138	842	72	1,136	6.1	152	589	15.5	233
Monthly avg.	1,989	708	72	976	8.2	156	503	12.7	202

*Figures for 1913 are for Germany in her present boundaries.
†On last day of year or month.
‡Figures for 1913 are for pre-war boundaries and include Luxemburg.
§Includes iron castings and scrap.

from the United States, Sweden and Denmark. During the later months of the year, the shortage of foreign exchanges and the establishment of an import control board for iron and steel resulted in a restriction of imports.

Domestic consumption of rolled products, which had already increased from 378,000 metric tons in January, 1933, to 579,000 tons in January, 1934, soared to 823,000 tons in August of the same year. In September there was a decline to 735,000 metric tons. Consumption for third quarter was ahead of the previous year's figure by 53 per cent. In August, the number of hours actually worked in the heavy steel industry increased to 69.3 per cent of capacity, against 57.2 per cent in January, and 52.4 per cent a year before.

During the first ten months of 1934, the output of pig iron was 7,679,721 metric tons, compared with 4,223,032 tons in the corresponding period of 1933. Raw steel production amounted to 9,760,256 metric tons, against 6,129,837 tons. The output of rolled products totaled 6,911,643 metric tons, compared with 4,392,396 tons. For the whole of 1934, German steel consumption is estimated at 164 kilograms per capita, against only 103 kilograms in 1933.

Steel Mills in Profit Area

Utilization of the capacity of production exceeded 60 per cent since March, and it is stated that the steel industry now operates again on a remunerative basis, despite the unfavorable results of coal exploitation, with which it is largely connected; in fact, two of the leading heavy industrial combines, the Good Hope Mining Co. and the Klockner Corp., which, a year previously still operated at a loss, resumed the payment of a small dividend of 3 and 2½ per cent respectively for their fiscal year ended June 30, 1934.

The United Steel Works Corp., which was reorganized last year and which still controls about half the German steel output, worked on a profitable basis, but is expected to use the profit against depreciation. The improvement of the financial situation is the more worth mentioning since all producers had to increase their staff, irrespective of their activity, as part of the government fight against unemployment, and many of them more or less voluntarily resumed operation of plants and furnaces that had been idle for some years. Even new plants were established.

Domestic steel prices remained stabilized throughout the year, and the former underbidding of cartel prices disappeared. Erection and extension of works for the manufacture of wire products from mild steel rods, and of steel tubes was forbidden. The new union of German iron merchants started activities at the beginning of 1934.

The various cartels of the wire industry were extended, and outsiders were compelled to join. By the end of October it became known that difficulties had arisen between German tube makers and the international tube cartel, as, owing to the increase of domestic deliveries, German producers had exceeded their quotas. The conflict was settled by a provisional understanding, the agreement apparently being to postpone final decisions until the Saar situation has been decided upon. Herr Peter Klockner, president of the Klockner Corp., stated, on the occasion of the meeting of shareholders of the company, that Germany would have to ask for an increase of quotas in the international steel export syndicate if present quotas were not sufficient to permit an increase of German exports of steel.

Sales of pig iron during the year increased rapidly. Domestic prices remained unchanged throughout the year, but export rebates were increased by 20 per cent, effective from July 1, 1934. The German pig iron association was prolonged for another period of three years.

Imports of iron ores were almost doubled during the first nine months of the year, totalling 6,199,037 metric tons, against 3,413,695 tons, this increase being due in particular to larger shipments from Sweden, France and Spain. At the same time various measures were taken, with the financial backing of the government, to increase domestic output of ores in all districts.

Notwithstanding a substantial advance in production and reopening of many mines which had been closed on account of their unprofitable working, the relation between domestic and foreign supplies of ores for the production of pig iron has scarcely changed. This means that the German industry will continue to depend upon foreign raw material for a long period.

This may only be changed to some extent by an increase of the consumption of scrap. Imports of scrap advanced to 470,967 metric tons during the first nine months of 1934, compared with 309,343 tons in 1933, most originating from Holland and Belgium. Exports, on the other hand, declined from 147,397 metric tons to 88,459 tons. Domestic scrap prices were raised in February, 1934, and are now 23 per cent more than in 1933.

Italian Steel Industry Is Being Further Organized

BY DR. GUIDO VANZETTI,
Special Correspondent, STEEL

IRON and steel output in Italy during 1934 was larger than in the preceding year, although not to the same extent as the 1933 production exceeded that of 1932.

The output of steel for the past year is estimated at 1,850,000 metric tons, against 1,783,650 tons in 1933 and 2,142,000 tons, the record production attained in 1929. The output for 1934 represents 88 per cent of the record output of 1929 and 62 per cent of the capacity of Italian steelworks, which is estimated at 3,000,000 metric tons per year.

The estimated production of rolled steel products in 1934 is 1,565,000 metric tons, compared with 1,498,234 tons in 1933 and 1,951,700 tons in the record year of 1929.

In pig iron, the output is estimated at 525,000 metric tons, against 517,078 tons in 1933 and 678,000 tons in 1929, which was the peak year of production. The 1934 output represents 77 per cent of the production of 1929 and 66 per cent of capacity, which is estimated at 800,000 metric tons. The production of ferroalloys even exceeded that of 1929, being estimated at 55,000 metric tons, against 47,957 tons in 1933 and the previous record of 51,800 tons in 1929.

The increase of iron and steel production in Italy necessitated larger imports of coal and coke, and during the first eight months of 1934, imports of solid fuel amounted to 7,583,438 metric tons, compared with 6,015,598 tons in the corresponding period of 1933. There was also an increase in imports of iron and steel scrap, which for the first eight months attained 477,458 metric tons, against 390,546 tons in the same period of 1933. The scrap market remained firm throughout the year.

Imports of iron and steel also showed an increase in 1934, due to a large extent to increased imports of steel, which were re-exported from Italy after having undergone various processes of fabrication. During the

first eight months, imports of iron and steel into Italy were 225,755 metric tons, compared with 162,572 tons in the same period of 1933.

Iron and steel prices in Italy are fixed by the Nuova Unione Siderurgica Italiana, a body organized for the sales of the Consorzio Produttori di Laminati di Ferro e di Acciaio, the latter organization including all the iron and steel works of Italy. Throughout 1934 prices were stable and practically the same as in the preceding year, the principal exception being a decrease of 2 per cent in the price of ordinary iron bars.

Interesting developments occurred in the national organization of the Italian iron and steel industry, which is now established on a corporate basis. Following the fundamental principle of the present regime in the economic domain, both the metallurgical and the mechanical industries are linked up in the form of a corporation that deals with all problems relating to both of these industrial branches and covers the whole cycle of production; the general principles applying to this corporation were laid down by the Duce in his address Nov. 11, 1934. Actual operation of the corporation has not yet commenced, and the extent to which it will exert its influence on productive activities and the control of industries in relation to market conditions is still being discussed.

Finances Are Reorganized

During the year, important measures of financial reconstruction relating to a number of well-known industrial concerns were carried out, with the support of the government. An organization named Instituto per la Ricostruzione Industriale (I.R.I.) has taken over from the leading Italian banks their control in a number of iron and steel works. During September, and under the auspices of the I.R.I., a new company, known as Acciaieria Cornigliano-Cogne, was formed to take over from Societa Nazionale Cogne a number of works, which were merged with works of S. A. Ansaldo.

The new company has taken over the Cornigliano steelworks of the Ansaldo company, and the iron ore mines, together with the greater part of the iron and steel works situated in the Aoste valley, which were operated by Societa Nazionale Cogne. It is expected that by these arrangements the new company will be in a position to extend considerably its activities and to operate with the maximum of efficiency. The new company will have a capital of 175,000,000 lira.

The Italian government continues to purchase a considerable tonnage of iron and steel products for the execution of public works, which developed considerably during 1934.

Belgium Finds Steel Trade Outlets Greatly Reduced

European Staff Special

THE year 1934 started in Belgium under fairly satisfactory auspices. January was marked by active markets, and the volume of business exceeded that during the preceding months. However, these encouraging signs applied mostly to the heavy steel works, and the working-up industries registered no such progress.

Furthermore, before the year was much advanced, market activities slowed down, and it was only toward the end of June that anything like interesting business developed, thanks to a number of substantial contracts, mainly for structural steel, plates and sheets.

Generally speaking, the South American market was more active than in previous years, but it became apparent that the revival of business in Argentine and Brazil was more favorable to Germany than to Belgium. It was also noticed that certain amount of business was captured by British firms, particularly as regards rolled and wire products. The activities of the wire nail trade were considerably curtailed by competition from foreign makers.

The wire products industry in Belgium has reached a state of depression from which it is hardly expected to be able to emerge, at least in the near future. This state of affairs is mainly due to higher tariff barriers. A number of works in the Fontaine L'Eveque district, which specialize in the manufacture of shoe nails had, in fact, to close down.

Similar conditions have detrimentally affected other working-up industries, not only because of the difficulty of overcoming high tariff duties, but because in other countries, which constituted an outlet for Belgium exports, measures have now been taken to manufacture nationally.

These conditions also pertain, up to a point, to the heavy steel industry, which once found important outlets in India, Japan, Mexico and Turkey, but these countries are now increasing their own production of steel products. The progress made in Russia, where the capacity of production is increasing year by year, is also a source of anxiety.

Soviets Still Buying

It is now being feared that Russia may even become a competitor in foreign markets. However, during the past year Russia herself has contracted for large tonnages of steel products, and these contracts have largely contributed to the activity of rolling mills located in the Charleroi district.

During the past year, Belgium was confronted with strong competition on the part of Germany, and lost many orders to that country. The present system of organization of export sales is criticized on this account by Belgian manufacturers, who claim that the formation of export syndicates has caused a number of Belgian exporters and agents to be superseded. Such firms had well-established connections in the various

Belgian and Luxemburg Business Progress in 1934

(Metric tons 000 omitted)

	PRODUCTION					IMPORTS BELGIUM & LUXEMBURG		EXPORTS BELGIUM & LUXEMBURG	
	BELGIUM			LUXEMBURG					
Monthly average	Coke	Pig iron and ferro-alloys	Steel ingots and castings	Pig iron and ferro-alloys	Steel ingots and castings	Pig iron	Steel§	Pig iron	Steel§
1913	294	207	206	212	98	48†	26†	1.4†	130†
1931	406	267	259	171	170	25	30	5.8	316
1932	368	229	232	163	163	17	18	3.0	285
1933	380	229	227	157	154	18	16	3.1	283
1934									
Jan.	379	223	226	153	151	17	12	4.6	285
Feb.	339	211	208	145	143	14	10	2.8	263
March	374	252	257	158	155	21	20	4.2	315
April	363	246	246	160	157	21	17	2.8	314
May	362	255	257	164	161	16	20	2.8	292
June	352	242	253	166	165	21	17	4.7	315
July	365	256	248	163	160	18	15	3.3	313
Aug.	371	251	252	164	163	20	17	4.9	290
Sept.	359	237	245	168	165	15	17	4.0	317
Oct.	371	254	257	174	176	...	...	...	...
Monthly average	364	242	245	161	160	18	15	3.4	300

†Belgium only.
§Includes iron castings and scrap.

markets in which they sold their products, and many have now been obliged to give way before a small number of privileged concerns. This has caused the more personal relations between buyer and producer to disappear; and, owing to the more efficient organization of Germany through the Stahlwerksverband, Belgian firms claim to have lost considerable business.

The following quotations, however, are given f.o.b. Antwerp, and it will be seen that basic prices were stable: Blooms were quoted at £2 5s and billets at £2 7s per ton, beams at £3 1s 6d, merchant bars at from £3 to £3 5s, and plates at from £4 to £4 2s 6d, all these prices being quoted in pounds at gold parity.

Market Problems Clarified

The international comptoirs have principally directed their attention to the organization of a number of important markets, especially Scandinavia, Japan and China. A change was also effected in regard to the relations of exporting firms or agents authorized by the syndicates, and these firms were allowed to purchase from the syndicates any kind of controlled product for any market, provided they sold these products at the c.i.f. prices fixed by the syndicates and without adding a rebate.

A number of modifications also took place inside the European steel entente. Owing to importance of the Italian market, Hungarian steel manufacturers requested that their quota be increased, but it was not possible to give them satisfaction, and, therefore, they remained outside the entente. On the other hand, Czechoslovakia joined the entente.

There were also contacts with representatives of the British steel industry, but no definite conclusion has yet been arrived at. The possibility of Great Britain joining the European steel entente is of considerable importance to Belgium, because it is believed that if Great Britain became a party to the cartel, there would be, as a counterpart, a limitation imposed on the export of merchant steel from Belgium, particularly in the British market.

An international agreement was arrived at for the export of tin plate, under the jurisdiction of the international steel entente and for a period of three years from July 1. The following countries are a party to this agreement: the United States, Great Britain, France, Germany, Italy and the Saar territory.

The general tendency in Belgium at the end of 1934 was toward disappearance of small independent rollers and working-up firms, and development of the larger steel concerns. Large producers have been compelled to take drastic steps to reduce production costs and modernize their equipment, and, of course, the bigger concerns are in a better position to adopt such a policy than are the smaller firms. Generally speaking, the year was almost disastrous for the smaller undertakings, but the heavy works were able to maintain their position, although their activities were reduced.

Canadian Steel Industry Makes Gain

ACTIVITY in the Canadian iron and steel industry throughout 1934 showed general improvement over 1933, with practically all branches contributing.

Operations and production by some sections of the industry were as much as 100 per cent above 1933 and 200 per cent better than in 1932, the year industrial depression touched bottom in Canada.

Production of iron and steel in Canada gives a rather definite indication of the extent of the improvement that took place last year. Pig iron output for the 12 months amounted to approximately 396,000 long tons, compared with 227,317 tons in 1933 and 144,130 tons in 1932. Steel ingots rose sharply to 736,203 long tons against 394,059 tons in the preceding year and 312,360 tons in 1932.

Steel castings at 21,000 tons were up from 15,920 tons in 1933 and slightly under the 22,915 tons reported for 1932. Ferroalloys with an output of 32,444 tons showed minor improvement over the 30,133 tons in 1933 and more than doubled the 15,487 tons reported for 1932.

While Canadian railroads contributed to some extent to the betterment in business for the steel industry last year, the improvement in this respect was due to orders placed late in 1933, and no large tonnage contracts appeared from this source in the past year.

Rail orders from South Africa, together with other substantial tonnages of steel business from other dominions and Great Britain, played an important part in stimulating activity and production.

Speeding-up of operations in the automotive branch also was a large contributing factor, while there also was a stronger market demand for sheets, plates and the wide variety of iron and steel materials produced in the various plants of the Dominion.

Building activities in 1934 were approximately 75 per cent above those of 1933, but most of this improvement was small structures and new dwellings. Only a few large buildings were erected in Canada during 1934, with the result demand for structural steel showed little change from the previous year, while the demand for builders' hardware rose sharply.

Mining Activity Aids Steel

Much of the credit for the betterment in the iron and steel industry last year was due directly to the almost sensational boom in mining activities in practically all mining centers of Canada. On this account there was a persistent demand for steel, tools, machinery and general supplies, while many new mills for the production of gold and other metals were erected and upwards of 25 new mills were placed in production. Activity in the mining fields in turn was reflected in other branches of industry, many of which were enabled to keep their wheels turning at a steady rate throughout the year.

Looking forward, it would appear that there is an excellent chance that 1935 will continue to show expansion in the steel industry. Canadian railroads are said to be considering new programs which will involve heavy purchase of rolling stocks, rails and track supplies on replacement account.

The automotive industry is preparing for another high production year; there is a favorable chance that building trades will pick up, while the mining industry will continue to flourish and expand for years and consequently play a large part in the furthering of activities in other branches of industry in Canada.

Canadian Production of Iron and Steel

Gross Tons

	Pig Iron	Steel Ingots	Steel Castings	Ferro-alloys
1923	880,018	839,710	45,060	29,961
1924	593,024	625,175	25,515	26,400
1925	570,397	733,855	18,840	25,709
1926	737,503	745,550	33,338	57,416
1927	707,697	867,928	39,710	56,230
1928	1,037,727	1,190,001	44,718	44,882
1929	1,090,244	1,309,543	70,145	80,010
1930	747,178	957,430	54,313	65,223
1931	420,038	664,826	37,055	46,764
1932	144,130	312,360	22,915	15,487
1933	227,317	394,059	15,920	30,133
1934 (a)	396,000	736,000	21,000	33,500

(a)—December production figures estimated

Buying Movement Broadens, Lifts Rate to 42½

Larger Structural Requirements—Mills Deferring Deliveries on Automobile Sheets—Scrap Still Rising—December Pig Iron Up 3.8 Per Cent

BEGINNING the new year vigorously, with broader market activity in which heavier structural steel tonnage and stronger demand for pig iron are conspicuous features, steelworks operations last week advanced 3½ points to 42½ per cent.

This rate is 11½ points above the corresponding period last year, and is supported by an earlier and much more general buying movement than at the outset of 1934.

Seasonal requirements are beginning to appear, particularly in practically all classifications of agricultural requirements. Public construction work, held back during the winter, is certain to expand shortly. Specifications from automobile manufacturers have increased to the point where mills are deferring deliveries. Some sheet mills are faced with six months' capacity production of cold-rolled material.

Steelmakers can see no obstruction to continuing improvement, unless it be in difficulties with labor. As operations rise the industry becomes more exposed to disturbance. Labor is renewing its drive for recognition, and the national steel labor relations board has called for payrolls of "productive" workers, ordering a supervised election at some plants.

Despite this, however, the industry's standing with the administration has been greatly strengthened by the extreme care it has taken to be fair, stopping short only of an outright closed shop, and it is doubtful if a strike would be sanctioned.

Structural Awards Increase; Heavier Reinforcing Bar Requirements in View

Structural shape awards for the week 25,323 tons, compared with 7855 tons in the last week of 1934, included 8250 tons for the Boston parcel post building; 3687 tons for the Winona, Minn., dam, 3100 tons for a bridge over Rocky river, Cuyahoga county (Cleveland).

To be awarded in January are 5100 tons of shapes for the Guttenberg, Iowa, dam, and these tonnages of reinforcing bars: 6000 tons, Monrovia-Pasadena, Calif., tunnel; 3250 tons, San Francisco-Oakland bridge, and 3500 tons, Moffatt, Colo., tunnel.

Plate awards in the week include 4000 tons, Owyhee, Oregon-Idaho irrigation project. Lone Star Gas Co. is considering constructing a 100-mile gas line in Texas, which may require 10,000 tons of steel pipe.

Pending a clearer definition of railroad requirements for 1935, current purchasing is light. To supplement 32,000 tons of rails to be ordered this month, Norfolk & Western is in the market for 1,030,000 tie plates, various sizes, 6000 riser plates, and 12,600 kegs of spikes. Seaboard Air Line has distributed 586,000 tie plates, Chesapeake & Ohio has ordered 1500 tons of car repair parts, and will buy 40 more hopper cars.

62,500 Tons of Tin Plate Placed in Wales; Japan Buys 100,000 Tons of Steel in Germany

With a 10-point rise to 45 per cent, tin plate mill operations have recovered all the ground lost during the holidays. A leading American canmaker has purchased 62,500 tons of tin plate from a Welsh producer for its Canadian plants.

It is reported Japan has placed orders for 100,000 tons of steel, mainly bars, in Germany. STEEL's London correspondent cables the British iron and steel industry is increasingly active, while steelworks on the Continent, except in Germany, are starting the year slowly.

Raw materials are strong, with backlog of orders for pig iron largest in six months, two more blast furnaces lighted in the Chicago district, and one at Cleveland. Cincinnati machine tool builders are buying considerable iron. A Canton, O., steelworks has purchased 3000 tons of basic. STEEL's steelworks scrap composite is up 17 cents to $11.71 on advances in the Middle West.

Daily average coke pig iron production in December, 33,153 gross tons, was 3.8 per cent larger than in November, while total output, 1,027,740 tons, is a gain of 7.3 per cent. For the year, 15,977,413 tons, is an increase of 20.8 per cent over 1933. Sixty-seven stacks were operating Dec. 31, seven more than Nov. 30.

Steelworks operations last week advanced 5 points to 47 per cent at Chicago; 16 to 77, Cleveland; 4 to 23½, eastern Pennsylvania; 6 to 53, Youngstown; 13 to 68, New England; 1 to 27½, Birmingham. Wheeling held at 80; Detroit 59; Buffalo 39; Pittsburgh 25.

STEEL's iron and steel price composite is up 5 cents to $32.51, due to scrap. The finished steel composite holds at $54.

COMPOSITE MARKET AVERAGES

	Jan. 5	Dec. 29	Dec. 22	One Month Ago Dec., 1934	Three Months Ago Oct., 1934	One Year Ago Jan., 1934	Five Years Ago Jan., 1930
Iron and Steel	$32.51	$32.46	$32.46	$32.39	$32.10	$31.15	$35.19
Finished Steel	54.00	54.00	54.00	54.00	54.00	51.10	55.63
Steelworks Scrap	11.71	11.54	11.25	11.02	9.40	11.24	14.16

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip and cast iron pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Jan. 5 1935	Dec. 1934	Oct. 1934	Jan. 1934
Finished Material				
Steel bars, Pittsburgh	1.80	1.80	1.80	1.75
Steel bars, Chicago	1.85	1.85	1.85	1.80
Steel bars, Philadelphia	2.09	2.09	2.09	2.04
Iron bars, Terre Haute, Ind.	1.75	1.75	1.75	1.60
Shapes, Pittsburgh	1.80	1.80	1.80	1.70
Shapes, Philadelphia	2.00½	2.00½	2.00½	1.90½
Shapes, Chicago	1.85	1.85	1.85	1.75
Tank plates, Pittsburgh	1.80	1.80	1.80	1.70
Tank plates, Philadelphia	1.98½	1.98½	1.98½	1.88½
Tank plates, Chicago	1.85	1.85	1.85	1.75
Sheets, No. 10, hot rolled, Pitts.	1.85	1.85	1.85	1.75
Sheets, No. 24, hot ann., Pitts.	2.40	2.40	2.40	2.25
Sheets, No. 24, galvan., Pitts.	3.10	3.10	3.10	2.85
Sheets, No. 10, hot rolled, Gary	1.95	1.95	1.95	1.85
Sheets, No. 24, hot anneal., Gary	2.55	2.55	2.55	2.35
Sheets, No. 24, galvan., Gary	3.20	3.20	3.20	2.95
Plain wire, Pittsburgh	2.30	2.30	2.30	2.20
Tin plate, per base box, Pitts.	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.60	2.60	2.60	2.35
Semifinished Material				
Sheet bars, open-hearth, Youngs.	$28.00	28.00	28.00	26.00
Sheet bars, open-hearth, Pitts.	28.00	28.00	28.00	26.00
Billets, open-hearth, Pittsburgh	27.00	27.00	27.00	26.00
Wire rods, Pittsburgh	38.00	38.00	38.00	36.00

	Jan. 5 1935	Dec. 1934	Oct. 1934	Jan. 1934
Pig Iron				
Bessemer, del. Pittsburgh	19.76	19.76	19.76	19.26
Basic, Valley	18.00	18.00	18.00	17.00
Basic, eastern, del. eastern Pa.	19.76	19.76	19.76	18.76
No. 2 foundry, del. Pittsburgh	19.26	19.26	19.26	18.76
No. 2 foundry, Chicago	18.50	18.50	18.50	17.50
Southern No. 2, Birmingham	14.50	14.50	14.50	13.50
No. 2X eastern, del. Philadelphia	20.63	20.63	20.63	19.63
Malleable, Valley	18.50	18.50	18.50	17.50
Malleable, Chicago	18.50	18.50	18.50	17.50
Lake Superior charcoal, del. Chi.	24.04	24.04	23.54	23.54
Gray forge, del. Pittsburgh	18.63	18.63	18.80	18.38
Ferromanganese, del. Pittsburgh	89.79	89.79	89.79	90.24
Scrap				
Heavy melting steel, Pittsburgh	$13.25	12.95	10.50	13.05
Heavy melt. steel, No. 2, east. Pa.	9.50	9.30	8.00	9.40
Heavy melting steel, Chicago	11.75	10.55	8.75	10.45
Rails for rolling, Chicago	12.25	11.65	8.90	11.25
Railroad steel specialties, Chicago	12.75	11.90	9.75	11.30
Coke				
Connellsville, furnace, ovens	3.60	3.60	3.60	3.60
Connellsville foundry, ovens	4.60	4.60	4.60	4.25
Chicago, by-product foundry, del.	9.25	9.25	9.25	9.25

Steel, Iron, Raw Material and Metals Prices

Prices conform to American Iron and Steel institute schedules. Asterisk denotes price change this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	1.85c
Gary, base	1.95c
Chicago, del.	1.98c
New York, del.	2.18c
Philadelphia, del.	2.14c
Birmingham, base	2.00c
St. Louis, del	2.17c
F.o.b. cars, dock, Pacific ports	2.40c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.40c
Gary, base	2.50c
Chicago, del.	2.53c
Detroit, del.	2.60c
New York, del.	2.73c
Philadelphia, del.	2.69c
Birmingham, base	2.55c
St. Louis, del.	2.72c
F.o.b. cars, dock, Pacific ports	3.05c

GALVANIZED No. 24

Pittsburgh, base	3.10c
Gary, base	3.20c
Chicago, del.	3.23c
Philadelphia, del.	3.39c
New York, del.	3.43c
Birmingham, base	3.25c
St. Louis, del.	3.42c
San Fran'co, f.o.b. cars, dock	3.70c

TIN MILL BLACK No. 28

Pittsburgh, base	2.75c
Gary, base	2.85c
St. Louis, del.	3.07c

COLD ROLLED No. 10

Pittsburgh, base	2.50c
Gary, base	2.60c
Detroit, delivered	2.70c
Philadelphia, del.	2.79c
New York, del.	2.83c
F.o.b. cars, dock, Pacific ports	3.10c

COLD ROLLED No. 20

Pittsburgh, base	2.95c
Gary, base	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.24c
New York, del.	3.28c

ENAMELING SHEETS

Pittsburgh, No. 10	2.50c
Pittsburgh, No. 20	3.10c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher.

Tin plate, coke base contract	$5.25
Do., waste waste	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.40c
Do., Gary	3.50c

Corrosion and Heat Resistant Alloys

Pittsburgh, base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold stp.	20.50	22.00	27.00	35.00

Steel Plates

Pittsburgh, base	1.80c
New York, del.	2.08c
Philadelphia, del.	1.98½c
Boston, del.	2.20c
Buffalo, del.	2.03½c
Chi. or Gary base	1.85c
Cleveland, del.	1.98½c
Birmingham, base	1.95c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific Coast, f.o.b. cars, dock	2.35c
St. Louis, del.	2.07c

Structural Shapes

Pittsburgh, base	1.80c
Philadelphia, del.	2.00½c
New York, del.	2.05½c
Boston, del.	2.18½c
Bethlehem, base	1.90c
Chicago, base	1.85c
Cleveland, del.	1.98½c
Buffalo, base	1.90c
Gulf ports	2.20c
Birmingham, base	1.95c
Pacific Coast, f.o.b. cars, dock	2.35c

Bars

SOFT STEEL

Pittsburgh, base	1.80c
Chicago or Gary	1.85c
Duluth, base	1.95c
Birmingham, base	1.95c
Cleveland, base	1.85c
Buffalo	1.90c
Detroit, del.	1.95c
Pacific Coast ports cars, dock, c.i.f.	2.35c
Philadelphia, del.	2.09c
Boston, del.	2.20c
New York, del.	2.13c
Pitts., forg. qual.	1.95c-2.05c

RAIL STEEL
To Manufacturing Trade

Pittsburgh, base	1.70c
Chicago or Gary, base	1.75c
Moline, Ill., base	1.75c
Cleveland, base	1.75c
Buffalo, base	1.80c

IRON

Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia, base	1.89c
Pittsburgh, refined	2.75-7.50c

REINFORCING

New billet, straight lengths, quoted by distributors.

Pittsburgh	2.05c
Chicago, Gary, Buffalo Cleve., Birm., Young	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. cars dock	2.45c
Philadelphia, del.	2.34c

Rail Steel

Straight lengths quoted by distributors

Pittsburgh, base	1.90c
Chicago, Buffalo, Cleveland, Birm., Young	1.95c
Gulf ports	2.30c

Wire Products □ □

(Prices apply to straight or mixed carloads; pool cars, or less, 10c up. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pitts.-Cleve. 100 lb. keg

Standard wire nails	$2.60
Cement coated nails	2.60
Galvanized nails, 15 gage and coarser	4.60c
do., 16 gage and finer	5.10c

(Per pound)

Polished staples	3.30c
Galvanized fence staples	3.55c
Barbed wire, galv.	3.00c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$63.00
Plain wire, 6-9 gage to mfg. trade	2.30c

Anderson, Ind., (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pittsburgh or Cleveland	2.90c

Do., Chicago up $1, Worcester, $2.

Cold-Finished Carbon Bars and Shafting □ □

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs and over	1.97½c

Gary, Ind., Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Alloy Steel Bars (Hot) □

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.45c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo. 0.50
4600 0.20 to 0.30 Mo. 1.25 1.75 Ni. 1.05
5100 0.80-1.10 Cr 0.45
5100 Cr. spring base
6100 bars 1.20
6100 spring 0.70
Cr., Ni., Van. 1.50
Carbon Van. 0.95
9250....Carbon base plus extras

Piling □ □

Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops □

Hot strip to 23⅛-in.

Pittsburgh	1.85c
Chicago, base	1.95c
Birmingham base,	2.00c
Detroit, delivered	2.05c
Phila., delivered	2.14c
New York, del.	2.18c
Cooperage hoop, Pittsburgh	1.95c
Chicago	2.05c
Cold-rolled strip, Pitts., Cleve.	2.60c
Worcester, Mass.	2.80c

Rails, Track Material □

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts. 24-45 lbs.	$27.00
50-60 lbs.	$24.00
70-75 lbs.	$18.00
80-85 lbs.	$25.00
100 lbs.	$26.00
Light Rails billet qual. Pitts., Chi.	$35.00
Do., reroll. qual.	$34.00
Angle bars, mills	2.55c
Spikes, R. R. base	2.40c
Track bolts, base	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs. up $8; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots. Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread	70-10-10 off
Rolled thread, ½ x 6 and smaller	70-10-10 off

MACHINE BOLTS

All sizes, cut thread lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts,	70-10-10 off
Tire bolts	60-10 off
Stove bolts, 75 off in pkgs.; 83 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch	
Rolled thread machine bolts, ½ x 6 and smaller	70-10-10 off
Step bolts	70-10 off
Elevator bolts	70-10 off

NUTS

S.A.E. semifinished hex.; ½ to ⅞-inch	70-10-10 off
Do., ½ to 1-inch	70-10-10 off
Do., over 1-inch	70-10 off

HEXAGON CAP SCREWS

Milled	85 off
Upset, 1-in., smaller	85 off

SQUARE HEAD SET SCREWS

Upset, 1-in. small	70-10 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila.	6.25 off

Cut Nails □ □

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more no discount on size extras	$3.05
Do. under 5 kegs; no discount on size extras	$3.20

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads, Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

In.	Steel Blk.	Steel Gal.
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55
Iron		
½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD

	Steel	
2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½
Iron		
2	37	22½
2½—3½	38	25
4—8	40	28½

LINE PIPE

	Steel
½, butt weld	57½
⅛-inch, butt weld	50½
¼—⅜, butt weld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63
Iron	

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

BOILER TUBES

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		Charcoal Iron	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 points under base.

SEAMLESS BOILER TUBES

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe □

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$38.00-39.00
4-in., Birmingham	41.00-42.00
4-in., Chicago	49.00-50.00
6 to 24-in., Chicago	46.00-47.00
6-in. & over, east fdy.	42.00
Do., 4-in.	45.00

Class A pipe $2 over Class B.

Stnd. fitgs., Birm. base	$100.00

Semifinished Steel □

BILLETS AND BLOOMS

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$27.00
Philadelphia	32.30
Duluth	31.00
Forging, Pitts., Chi. and Buffalo	32.00
Forging, Duluth	36.00

SHEET BARS

Pitts., Cleve., Young., Chi., Buff., Canton, O., and Sparrows Point, Md.	28.00

SLABS

Pitts., Cleve., Young.	27.00

WIRE RODS

(Common; combination up $2)

Pitts., Cleveland	38.00
Chicago	39.00
Worcester, Mass.	40.00

SKELP

Pitts., Chicago	1.70c

Coke □ □ □

Price Per Net Ton

BEEHIVE OVENS

Connellsville, fur.	$3.60- 3.85
Connellsville, fdry.	4.60
Connel. prem. fdry.	5.10
New River fdry.	6.00
Wise county fdry	4.45- 5.25
Wise county fur.	4.00- 4.50

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.71- 9.31
Chi., ov., outside del.	8.50
Chicago, del.	9.25
New England, del.	11.00
St. Louis, del.	9.25
Birmingham, ovens	6.00
Indianapolis, del.	8.75
Cincinnati, del.	9.30
Cleveland, del.	9.25
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.50
Philadelphia, del.	9.00

Coke By-Products □

Per gallon, producers' plants.

Tank lots

	Spot
*Pure benzol	15.00c
*90 per cent benzol	15.00c
Toluol	30.00c
Solvent naphtha	26.00c
Commercial xylol	26.00c

Per lb. f.o.b. New York.

Phenol (200 lb. drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

†Naphthalene flakes and balls, in bbl.	5.50c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices, ½-cent up.

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	
Baltimore*	2.90c
Boston††	2.95c
Buffalo	3.00c
Chattanooga	3.31c
Chicago	2.95c
Cincinnati	3.15c
Cleveland	2.95c
Detroit	3.03½c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.30c
New York‡(d)	3.22c
Pittsburgh(h)	2.90c
Philadelphia*	2.90c
San Francisco	3.60c
Seattle	3.60c
St. Louis	3.19c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS	
Portland	3.40c
Chattanooga	3.31c
Baltimore*	3.00c
Chicago	2.75c
Cincinnati	3.15c
New York‡(d)	3.32c
Philadelphia*	2.90c
St. Louis	3.19c
Tulsa	3.25c

REINFORC. BARS	
Buffalo	2.60c
Chattanooga	3.31c
Chicago	2.10c-2.60c
Cleveland(c)	1.97½c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl.	2.15c
New Orleans	3.50c
Pitts., plain(h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	3.50c
St. Louis	3.24c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES	
Baltimore*	3.90c
Boston††	3.17c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.40c
Cleveland	3.31c
Detroit	3.40c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.55c
New York(d)	3.37c
Philadelphia*	2.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

PLATES	
Baltimore*	2.90c
Boston††	3.18c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.40c
Cleveland, ¼-in. and over	3.31c
Detroit	3.40c
Detroit, 5/16-in.	3.65c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.55c
New York(d)	3.40c
Philadelphia*	2.95c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE	
Baltimore*	3.05c
Boston††	3.25c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.00c
Cincinnati	3.20c
Cleveland	3.11c
Det., 8-10 ga.	3.13½c
Houston	3.35c
Los Angeles	3.80c
New Orleans	3.55c
New York	3.27c
Portland	3.75c
Philadelphia*	3.05c
Pittsburgh(h)	2.95c
San Francisco	3.75c
Seattle	3.75c
St. Louis	3.29c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK	
Baltimore*††	3.51c
Boston (g)	3.90c
Buffalo	3.25c
Chattanooga	4.21c
Chicago	3.85c
Cincinnati	4.05c
Cleveland	3.91c
Detroit	3.98½c
Los Angeles	4.45c
New York	3.85c
Philadelphia*†	3.55c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.40c
Seattle	4.40c
St. Louis	4.09c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS	
Baltimore*††	4.21c
Buffalo	4.00c
Boston (g)	4.60c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.70c
Cleveland	4.61c
Detroit	4.70c
Houston	4.40c
Los Angeles	5.05c
New Orleans	4.95c
New York	4.50c
Philadelphia*†	4.25c
Pitts.** (h)	4.15-4.45c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.79c
St. Paul	4.19c
Tulsa	5.10c

BANDS	
Baltimore*	3.15c
Boston††	3.25c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.45c
Cleveland	3.36c
Detroit, ⅝-in. and lighter	3.38½c
Houston	3.25c
Los Angeles	3.90c
New Orleans	3.59c
New York(d)	3.62c
Philadelphia	3.15c
Pittsburgh(h)	3.20c
Portland	3.90c
San Francisco	4.05c
Seattle	3.90c
St. Louis	3.54c
St. Paul	3.20c
Tulsa	3.45c

HOOPS	
Baltimore	2.30c
Boston	4.25c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.45c
Det., No. 14 and lighter	3.38½c
New York	3.62c
Philadelphia	3.40c
Pittsburgh(h)	3.70c
Seattle	5.60c
St. Louis	3.54c
St. Paul	3.75c

COLD FIN. STEEL	
Baltimore (c)	3.71c
Boston	4.00c-4.50c
Buffalo (h)	3.55c
Chattanooga*	4.06c
Chicago (h)	3.50c
Cincinnati	3.70c
Cleveland (h)	3.50c
Detroit	3.63½c
Los Ang.(f)(d)	4.95c
New Orleans	4.30c
New York	3.92c-4.42c
Philadelphia	3.73c
Pittsburgh(h)	3.45c
Portland (f)	4.75c
San Fran.(f)(d)	5.95c
Seattle(f) (d)	4.75c
St. Louis	3.74c
St. Paul	3.20c
Tulsa	4.65c

COLD ROLLED STRIP	
Boston, 0.100-in., 500 lb. lots	5.35c
Buffalo	3.39c
Chicago	3.27c
Cincinnati(b)	3.42c
Cleveland (b)	3.20c
Detroit	3.33c
New York	4.70c
St. Louis	3.36c

(b) Plus straightening, cutting and quantity differentials.
(c) Plus mill, size and quantity extras.
(d) Minus quant. diff.
(e) New mill classif.
(f) Rounds only.
(g) 50 bundles or over.
(h) Outside delivery, 10c less.

‡Domestic bars.
*Plus quan. extras.
**Under 25 bundles.
*†50 or more bundles.
†New extras apply.
††Base 40,000 lbs. extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Jan. 2

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons	
			Quoted in dollars at current value	**Quoted in gold pounds sterling
PIG IRON	£ s d			£ s d
Foundry, 2.50-3.00 Silicon	$15.19	3 1 6	$13.64	1 14 0
Basic bessemer	13.59	2 15 0*	12.83	1 12 0
Hematite, Phos. .03-.05	15.44	3 2 6	.....	.....
SEMIFINISHED STEEL				
Billets	$27.17	5 10 0	$18.85	2 7 0
Wire rods, No. 5 gage	38.53	7 16 0	36.08	4 10 0
FINISHED STEEL				
Standard rails	$38.29	7 15 0	$44.10	5 10 0
Merchant bars	1.66c	7 10 0	1.15c to 1.19c	3 2 6 to 3 5 0
Structural shapes	1.63c	7 7 6	1.12c	3 1 6
Plates, †¼ in. or 5 mm.	1.77c	8 0 0	1.50c	4 2 6
Sheets, black, 24 gage or 0.5 mm.	2.04c	9 5 0	2.11c	5 16 0
Sheets, gal., 24 gage, corr.	2.49c	11 5 0	2.36c	6 10 0
Bands and strips	1.88c	8 10 0	1.45c	4 0 0
Plain wire, base	2.04c	9 5 0	1.94c	5 7 6
Galvanized wire, base	2.49c	11 5 0	2.27c to 2.32c	6 5 6 to 6 7 6
Wire nails, base	2.65c	12 0 0	2.09c	5 15 0
Tin plate, box 108 lbs.	$ 4.45	0 18 2	.....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

			French Francs		Belgian Francs		Reich Marks
	£ s d						
Fdy. pig iron, Si. 2.5	$16.67	3 7 6(a)	$13.92	210	$14.60	310	$25.43	63
Basic bessemer pig iron	16.67	3 7 6(a)*	12.27	185	13.19	280	28.05	(b)69.50
Furnace coke	4.32	0 17 6	7.96	120	5.18	110	7.67	19
Billets	27.17	5 10 0	28.51	430	20.72	440	38.95	96.50
Standard rails	1.82c	8 5 0	2.08c	694	2.31c	1,100	2.42c	132
Merchant bars	1.90c	8 12 0	1.68c	560	1.16c	550	2.01c	110
Structural shapes	1.93c	8 15 0	1.65c	550	1.16c	550	1.97c	107.50
Plates, †¼-in. or 5 mm.	2.00c	9 1 3	2.10c	700	1.47c	700	2.32c	127
Sheets, black	2.32c	10 10 0§	2.55c	850‡	1.63c	775‡	2.64c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.87c	13 0 0	4.50c	1,500	3.15c	1,500	6.77c	370
Plain wire	2.04c	9 5 0	3.15c	1,050	2.31c	1,100	2.73c	173
Bands and strips	2.07c	9 7 0	1.95c	650	1.47c	700	2.32c	127

*Basic. †British ship-plates. Continental, bridge plates. 24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b hematite.
**Gold pound sterling carries a premium of 64.75 per cent over paper sterling.

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25; 50-cent differentials apply to any grade below 1.75. Gross tons.

BASING POINTS:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$19.50	$20.00	$19.00	$20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Birmingham, Ala., southern del.	14.50	.....	13.50	19.00
Buffalo	18.50	19.00	17.50	19.50
Chicago	18.50	18.50	18.00	19.00
Cleveland	18.50	18.50	18.00	19.00
Detroit	18.50	18.50	18.00	19.00
Duluth	19.00	19.00	.....	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Everett, Mass.	19.50	20.00	19.00	20.50
Granite City, Ill.	18.50	18.50	18.00	.....
Hamilton, O.	18.50	18.50	18.00	19.00
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Sparrows Point, Md.	19.50	.....	19.00	.....
Swedeland, Pa.	19.50	20.00	19.00	20.50
Toledo, O.	18.50	18.50	18.00	19.00
Youngstown, O.	18.50	18.50	18.00	19.00
DELIVERED FROM BASING POINTS:				
Akron, O., from Cleveland	19.76	19.76	19.26	20.26
Baltimore from Birmingham	20.02	.....	19.90	.....
Boston from Birmingham	19.62	.....	19.50	.....
Boston from Everett, Mass.	20.00	20.50	19.50	21.00
Boston from Buffalo	20.00	20.50	19.50	21.00
Brooklyn, N. Y., from Bethlehem	21.77	22.27	.....	.....
Brooklyn, N. Y., from Bmgham.	21.39	.....	.....	.....
Canton, O., from Cleveland	19.76	19.76	19.26	20.26
Chicago from Birmingham	†18.72	.....	18.60	.....
Cincinnati from Hamilton, O.	19.51	19.51	19.01	.....
Cincinnati from Birmingham,	19.13	.....	19.01	.....
Cleveland from Birmingham	18.62	.....	18.50	.....
Indianapolis from Hamilton, O.	20.77	20.77	20.27	21.27
Mansfield, O., from Toledo, O.	20.26	20.26	19.76	20.76
Milwaukee from Chicago	19.50	19.50	19.00	20.00
Muskegon, Mich., from Chicago, Toledo or Detroit	21.40	21.40	20.90	21.90
Newark, N. J., from Birmingham	20.51	.....	.....	.....
Newark, N. J., from Bethlehem	20.89	21.39	.....	.....
Philadelphia from Birmingham	19.88	.....	19.76	.....
Philadelphia from Swedeland, Pa.	20.26	20.76	19.76	.....
Pittsburgh district from Neville Island	(Neville Island base, plus 63c, 76c and $1.13 switching chgs.)			
Saginaw, Mich., from Detroit	20.60	20.60	20.10	21.10
St. Louis from Granite City, Ill.	19.00	19.00	18.50	.....
St. Louis from Birmingham	18.62	.....	18.50	.....
St. Paul from Duluth	20.94	20.94	.....	21.44

†Over 0.70 phos.

LOW PHOS.

Basing Points: Birdsboro, Pa., Steelton, Pa., and Standish. N. Y.—$23.50. Basing Point: †Johnson City, Tenn.—$23.50 †Off grade material is $19.50

Philadelphia, standard and copper bearing 24.63

GRAY FORGE		CHARCOAL	
Valley furnace	18.00	Lake Superior fur.	21.00
Pitts. dist. fur.	18.00	Do., del. Chicago	24.04

SILVERY†

Jackson County, O., base; 6%—$22.75; 7—$23.75; 8—$24.75; 9—$25.70; 10—$26.75; 11—$27.75. Buffalo base prices, $1.25 higher.

BESSEMER FERROSILICON†

Jackson County, O., base, 10%—$27.75; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25. Buffalo base prices $1.25 higher.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Iron Ore □ □

LAKE SUPERIOR ORE

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbes.	4.65

EASTERN LOCAL ORES

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

FOREIGN ORE

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.,	10.00
No. Afr. & low phos.	9.50
Swedish basic, 65%	9.00
Swedish low phos.	9.50
Spanish No. Africa basic, 50 to 60%	9.00
Tungsten, spot, sh. ton unit, duty pd.	$17.75-18.25
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$18.00-18.50

Manganese Ore □

(Nominal)

Prices not including duty, cents per unit cargo lots.

Caucasian, 52-55%	26.00
So. African, 52%	26.00
So. Afr., 49-51%	24.00
Indian, 58-50%	nominal
Indian, 48-50%	nominal

Refractories □ □

Per 1000 f.o.b. Works

FIRE CLAY BRICK

First Quality.

Pa., Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	45.00

Second Quality

Pa., Ill., Ky., Md., Mo., Ga., Ala.	40.00

Ohio

First quality	$40.00
Intermediary	36.00
Second quality	25.00

MALLEABLE BUNG BRICK

All bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

MAGNESITE

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases	40.00
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash.	22.00

BASIC BRICK

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Magnesite brick	$65.00
Chrome brick	45.00
Chemicaly bonded magnesite	55.00

Fluorspar, 85-5 □ □

Washed gravel, duty paid, tide, net ton	$19.50
Washed gravel f.o.b. Ill., Ky., net ton, carloads	$15.50-16.00

Ferroalloys □ □

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
Do., Balti. base	85.00
Do., del. Pittsburgh	89.79
Spiegeleisen, 19-20% dom. fur. spot†	26.00
Ferrosilicon, 50% freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent	126-130.00

Spot, $5 a ton higher.

Silicomang., 2½ carb.	90.00

2% carbon, 95.00; 1%, 105.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Ferrotungsten, stand., lb. cont. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont., on analysis	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $2 unitage	12.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	55.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply.

Nonferrous Mill Products

F.o.b. mill base, cents per lb. except as specified. Copper, brass products based on 9.00c Conn. copper.

Sheets	
Yellow brass (high)	14.25
Copper, hot rolled	16.00
Lead, cut, to jobbers	7.25
Zinc, 100-lb. base	9.50
Tubes and Pipes	
High yellow brass	16.00
Seamless copper	16.25
Rods	
High yellow brass	12.75
Copper, hot rolled	13.25
Anodes	
Copper, untrimmed	13.75
Wire	
Yellow brass (high)	14.75

Old Metals □ □

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	
New York	4.37½-4.62½
Chicago	4.37½-4.62½
Cleveland	5.00- 5.25
St. Louis	4.50- 4.75
Heavy Copper and Wire	
New York	5.75- 6.00
Chicago, No. 1	5.50- 5.75
Cleveland	5.00- 5.50
St. Louis	5.25- 5.50
Composition Brass Borings	
New York	3.87½-4.12½
Light Copper	
New York	4.50- 4.75
Chicago	4.25- 4.75
Cleveland	4.25- 4.75
St. Louis	4.50- 4.75
Light Brass	
Chicago	2.25- 2.50
Cleveland	2.50- 2.75
Lead	
New York	2.75- 2.85
Cleveland	2.75- 3.00
Chicago	2.62½-2.87½
St. Louis	2.75- 2.90
Zinc	
New York	1.75- 2.00
Cleveland	1.75- 2.00
St. Louis	2.40- 2.50
Aluminum	
Borings, Cleveland	7.50- 8.00
Mixed, cast, Clev.	11.50-12.00
Mixed, cast, St. L.	12.00-12.50
Clips, soft, Cleve.	13.00-13.50

Secondary Metals □

Brass ingot, 85-5-5-5	8.25
Stand. No. 12 Alum.	16.00

Iron and Steel Scrap Prices

Corrected to Friday night Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	9.00- 9.50
Boston, dock, expt.	8.25- 8.50
Boston, domestic	6.50- 6.75
Buffalo, No. 1	10.25-11.00
Buffalo, No. 2	9.00- 9.50
Chicago, No. 1	11.50-12.00
Cleveland, No. 1	10.50-11.00
Cleveland, No. 2	10.00-10.50
Detroit, No. 1	9.50-10.00
Detroit, No. 2	8.50- 9.00
Eastern Pa.	11.00
Eastern Pa. No. 2	9.50
Federal, Ill.	8.00- 8.50
Granite City, R. R.	9.00- 9.50
Granite City, No. 2	6.50- 7.00
N. Y., deal. No. 2	7.00- 7.25
N. Y., deal. R. R.	8.50- 8.75
Pittsburgh, No. 1	13.00-13.50
St. Louis	7.50- 8.00
Valleys, No. 1	12.50-13.00

COMPRESSED SHEETS □

Buffalo, dealers	9.00- 9.50
Chicago, factory	11.00-11.50
Cleveland	10.50-11.00
Detroit	10.00-10.50
E. Pa., new mat.	9.50-10.00
Pittsburgh	13.00-13.50
St. Louis	7.00- 7.50
Valleys	12.00-12.50

BUNDLED SHEETS □ □

Buffalo	6.50- 7.00
Cincinnati, del.	6.50- 7.00
Cleveland	8.00- 8.50
Pittsburgh	11.25-11.75
St. Louis	5.00- 5.50

SHEET CLIPPINGS, LOOSE □

Chicago	5.50- 6.00
Cincinnati	5.50- 6.00
Detroit	5.00- 5.50
St. Louis	5.00- 5.50

STEEL RAILS, SHORT □

Birmingham	12.00-12.50
Buffalo	12.00-12.75
Chicago (3 ft.)	13.00-13.50
Chicago (2 ft.)	14.00-14.50
Cincinnati, del.	11.50-12.00
Detroit	12.00-12.50
Pitts., open-hearth, 3 ft. and less	14.50-15.00
St. Louis, 2 ft. & less	11.50-12.00

STEEL RAILS, SCRAP □

Boston	6.50- 6.75
Chicago	11.50-12.00
Pittsburgh	13.00-13.50

STOVE PLATE □ □

Birmingham	6.00- 6.50
Boston, dealers	3.25- 3.75
Buffalo	8.75- 9.25
Chicago, net	6.50- 7.00
Cincinnati, dealers	5.50- 6.00
Detroit, net	6.00- 6.50
Eastern Pa.	8.50- 9.00
N. Y., deal. fdry.	6.00
St. Louis	5.50- 6.00

COUPLERS, SPRINGS

Buffalo	12.50-13.00
Chicago, springs	12.50-13.00
Eastern Pa.	14.00-14.50
Pittsburgh	14.50-15.00
St. Louis	10.00-10.50

ANGLE BARS—STEEL □

Chicago	12.50-13.00
St. Louis	9.50-10.00

RAILROAD SPECIALTIES

Chicago	12.50-13.00

LOW PHOSPHORUS

Buffalo, billets and bloom crops	12.50-13.00
Cleveland, billet, bloom crops	14.50-15.00
Eastern Pa., crops	15.00-15.50
Pittsburgh, billet, bloom crops	14.50-15.00
Pittsburgh, sheet bar crops	13.50-14.00

FROGS, SWITCHES □ □

Chicago	11.50-12.00
St. Louis, cut	10.00-10.50

SHOVELING STEEL □ □

Chicago	11.50-12.00
Federal, Ill.	6.75- 7.00
Granite City, Ill.	6.00- 6.50

RAILROAD WROUGHT □

Birmingham	7.50- 8.00
Boston, dealers	6.00- 6.50
Buffalo, No. 1	8.00- 8.50
Buffalo, No. 2	10.25-11.00
Chicago, No. 1, net	10.50-11.00
Chicago, No. 2	11.50-12.00
Cincinnati, No. 2	8.50- 9.00
Eastern Pa.	11.50-12.00
N. Y., No. 1, deal.	7.00- 7.50
St. Louis, No. 1	6.50- 7.00
St. Louis, No. 2	7.50- 8.00

SPECIFICATION PIPE □

Boston	3.00- 3.25
Eastern Pa.	8.50- 9.50
New York, dealers	3.50- 4.00

BUSHELING □ □

Buffalo, No. 1	9.00- 9.50
Chicago, No. 1	10.00-10.50
Cinci., No. 1, deal.	6.00- 6.50
Cincinnati, No. 2	3.50- 4.00
Cleveland, No. 2	7.50- 8.00
Detroit, No. 1, new	8.50- 9.00
Valleys, new, No. 1	12.00-12.50

MACHINE TURNINGS □

Birmingham	4.50- 5.00
Boston, dealers	1.75- 2.00
Buffalo	5.00- 5.50
Chicago	6.00- 6.50
Cincinnati, dealers	4.00- 4.50
Cleveland	7.50- 8.00
Detroit	5.50- 6.00
Eastern Pa.	6.00- 6.50
New York, dealers	3.00- 3.50
Pittsburgh	8.50- 9.00
St. Louis	3.00- 3.50
Valleys	9.25- 9.75

BORINGS AND TURNINGS □

For Blast Furnace Use

Boston, dealers	3.25- 3.50
Buffalo	5.50- 6.00
Cincinnati, dealers	4.00- 4.50
Cleveland	7.50- 8.00
Detroit	5.75- 6.25
Eastern Pa.	5.00
New York, dealers	1.50- 1.75
Pittsburgh	6.00- 6.50

CAST IRON BORINGS

Birmingham, plain	4.50- 5.00
Boston, chemical	8.50- 9.00
Boston, dealers	3.25- 3.50
Buffalo	5.50- 6.00
Chicago	6.50- 7.00
Cincinnati, dealers	4.00- 4.50
Cleveland	7.50- 8.00
Detroit	5.75- 6.25
E. Pa., chemical	12.00-13.00
New York, dealers	1.50- 1.75
Pittsburgh	6.00- 6.50
St. Louis	3.00- 3.50

PIPE AND FLUES □ □

Cincinnati, dealers	4.50- 5.00

RAILROAD GRATE BARS □

Buffalo	6.50- 7.00
Chicago, net	5.75- 6.25
Cincinnati	4.50- 5.00
Eastern Pa.	8.50- 9.00
New York, dealers	4.00- 4.50
St. Louis	4.50- 5.00

FORGE FLASHINGS □ □

Boston, dealers	5.00- 5.50
Buffalo	9.00- 9.50
Cleveland	9.00- 9.50
Detroit	8.00- 8.50

FORGE SCRAP □ □

Boston, dealers	5.00- 5.25
Chicago, heavy	12.50-13.00
Eastern Pa.	9.00- 9.50

ARCH BARS, TRANSOMS

St. Louis	11.50-12.00

AXLE TURNINGS □ □

Boston, dealers	3.00- 3.50
Buffalo	7.00- 7.50
Chicago, elec. fur.	10.50-11.00
Cleveland	7.50- 8.00
Eastern Pa.	9.50-10.00
St. Louis	6.50- 7.00

STEEL CAR AXLES □ □

Birmingham	12.50-13.00
Boston, ship. point.	10.00-10.50
Buffalo	12.50-13.00
Chicago, net	16.00-16.50
Eastern Pa.	16.50-17.00
St. Louis	12.25-12.75

SHAFTING □ □

Boston, ship. point.	11.75-12.00
Eastern Pa.	16.50-17.00
New York, dealers	10.75-11.25
St. Louis	11.50-12.00

CAR WHEELS □ □

Birmingham	9.00- 9.50
Boston, iron deal.	5.50- 6.00
Buffalo, iron	11.00-11.50
Buffalo, steel	12.00-12.50
Chicago, iron	12.00-12.50
Chicago, rolled steel	12.50-13.00
Cincinnati, iron	8.50- 9.00
Eastern Pa., iron	10.50-11.00
Eastern Pa., steel	14.00-14.50
Pittsburgh, iron	12.00-12.50
Pittsburgh, steel	14.50-15.00
St. Louis, iron	7.50- 8.00
St. Louis, steel	9.50-10.00

No. 1 CAST SCRAP □ □

Birmingham	9.50-10.00
Boston, No. 2	6.00
Boston, tex. con.	8.50- 9.00
Buffalo, cupola	9.75-10.25
Buffalo, mach.	11.25-11.75
Chicago, agri. net	9.00- 9.50
Chicago, mach. net	11.25-11.75
Chicago, railr'd net	10.25-10.75
Cinci., mach. cup	9.50-10.00
Cleveland, cupola	12.00-12.50
Detroit, net	9.50-10.00
Eastern Pa., cupola	11.00-11.50
Pittsburgh, cupola	13.50-14.00
San Francisco, del.	13.50-14.00
Seattle	7.00- 8.50
St. Louis, No. 1	8.50- 9.00
St. L., No. 1 mach.	10.25-10.75

HEAVY CAST □ □

Boston, del.	5.50- 5.75
Buffalo, break.	8.50- 9.00
Cleveland, break.	9.00- 9.50
Detroit, break.	7.00- 7.50
Detroit, auto net	9.50-10.00
Eastern Pa.	10.50
N. Y. break. deal.	6.50- 6.75
Pittsburgh	12.00-12.50

MALLEABLE □ □

Boston, consum.	10.00-10.50
Buffalo	11.00-11.50
Chicago, R. R.	12.50-13.00
Cincinnati, agri. del.	8.00- 8.50
Cleveland, rail	12.00-12.50
Detroit, auto	11.00-11.50
St. Louis, R. R.	10.00-10.50
Eastern Pa., R. R.	10.50-11.00

RAILS FOR ROLLING □

5 feet and over

Birmingham	10.00-10.50
Boston, dealers	8.00- 8.50
Buffalo	10.25-11.00
Chicago	12.00-12.50
Eastern Pa.	12.50-13.00
New York, dealer	7.50- 8.00
St. Louis	10.00-10.50

LOCOMOTIVE TIRES □

Chicago (cut)	12.50-13.00
St. Louis, No. 1	10.00-10.50

LOW PHOS. PUNCHINGS □

Buffalo	12.50-13.00
Chicago	13.00-13.50
Eastern Pa.	14.50-15.00
Pittsburgh	13.50-14.00

Nonferrous Metal Prices of the Week

Spot unless otherwise specified. Cents per pound

	Copper: Electro., del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Chinese Spot, N. Y.	Nickel Cathodes
Dec. 29	9.00	9.12½	7.50	50.70	50.70	3.70	3.55	3.72½	*19.00	13.75	35.00
Dec. 31	9.00	9.12½	7.50	50.75	50.75	3.70	3.55	3.72½	*19.00	13.75	35.00
Jan. 1—Holiday											
Jan. 2	9.00	9.12½	7.50	50.72½	50.77½	3.70	3.55	3.72½	*19.00	13.75	35.00
Jan. 3	9.00	9.12½	7.50	50.67½	50.77½	3.70	3.55	3.72½	*19.00	13.75	35.00

*Nominal range 19.00c to 21.00c.

LOGEMANN

Scrap Metal Presses

From the gigantic unit, to compress complete junk automobiles into bales, down to small presses making bricks for crucible melting, LOGEMANN scrap metal presses cover a wide range of sizes and capacities to meet all conditions. Hydraulic and Mechanical types.

Straighteners

Powerful hydraulic machines, with moving press units and either lathe or roller supports to revolve the work, insure the extreme accuracy necessary on heavy machine rolls and tubes. Capacities 70 to 500 tons.

Pumps

Vertical — horizontal — single or double pressure — spur or helical gear drives — anti-friction bearings. Single, double or triple plungers. Pressures up to 50,000 lbs. per square inch.

Special Hydraulic Applications

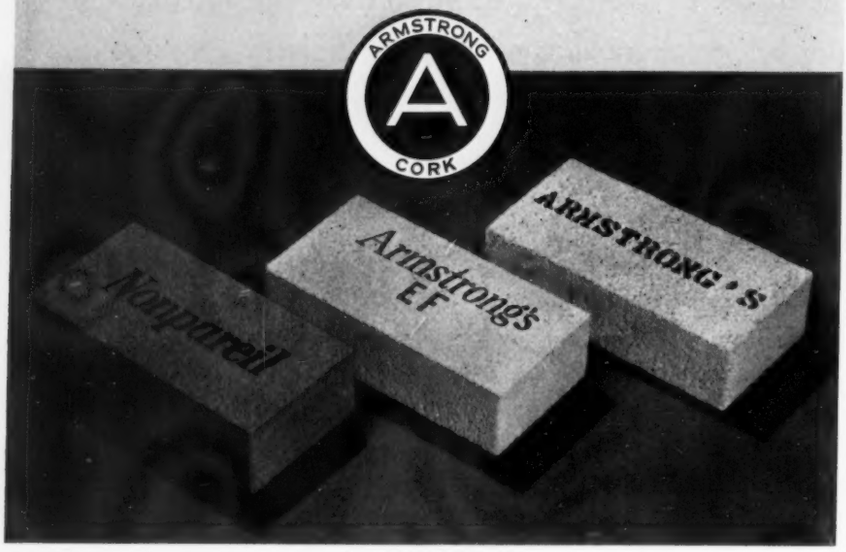
Drawing on an extensive experience of over 50 years, LOGEMANN engineers will gladly investigate special hydraulic applications, and submit a recommendation.

Logemann Brothers Co.,

3126 W. Burleigh St., Milwaukee, Wis.

INSURE UNIFORM HEAT, FUEL SAVING AND ACCURATE TEMPERATURE CONTROL

with Armstrong's High Temperature Products



FURNACES insulated or built with Armstrong's high temperature Brick can be depended upon for successful results. And with good reason! Armstrong's technical background and experience in insulation manufacture and research, as well as constant, careful testing insure insulating and semi-refractory brick whose high efficiency never varies.

Specially designed tunnel kilns—in which correct temperatures are rigidly maintained—are used to fire the brick made by Armstrong. Temperatures are checked three ways; first by a recording potentiometer, second by an optical pyrometer, third by pyrometric cones in each kiln car. Every brick is machine-sized to insure tight joints.

Daily tests are made on weight and crushing strength. Periodic checks are made on the thermal conductivity. Every 400th brick is measured with a micrometer to insure exact sizing.

No wonder the brick you get are so uniform and so reliable! As a result of their high efficiency and dependability, leading furnace builders, as well as the engineering departments of industrial plants, have standardized on Armstrong's high temperature insulation.

Choose the type you need!

Armstrong's high temperature products are furnished in the following forms:

For temperatures up to 1600° F. behind the refractory, use of Nonpareil Insulating Brick is recommended. The weight is only 1.8 pounds. Crushing strength is 200 pounds per square inch.

For temperatures up to 2500° F. behind the refractory, use Armstrong's Insulating Brick. It weighs only 2.2 pounds, and has a crushing strength of 225 pounds per square inch.

For temperatures up to 2475° F. for direct exposure use Armstrong's EF Brick. This light-weight semi-refractory brick weighing only 2¾ pounds with a crushing strength of 400 pounds per square inch requires no fire brick protection except when exposed to abrasion or slagging action. Thus walls may be made thinner and lighter, heating time shortened, and production speeded up.

All three brick are available in standard fire brick shapes and in special shapes up to 12" x 24" x 4½". For details and samples of these brick, write Armstrong Cork & Insulation Company, Insulation Division, 985 Concord Street, Lancaster, Pennsylvania.

Armstrong's

HIGH TEMPERATURE BRICK

Armstrong's* • EF • *Nonpareil

Key to NRA Codes

(*Concluded from Page* 108)

Industry	Date Code Approved (usually effective 10 days thereafter)	Address of Code Authority

Railway and industrial spring, May 4, 1934.

Railway safety applicance, Jan. 29, 1934, 230 Park avenue, New York.

Refractories, Dec. 28, 1933, 1608 Walnut street, Philadelphia.

Reinforcing materials fabricating, Dec. 11, 1933, Concrete Steel Co., New York.

Road machinery, Nov. 20, 1933, 410 North Michigan avenue, Chicago.

Rock crusher machinery, Nov. 1, 1933, 400 North Michigan avenue, Chicago.

Rolling steel door, Jan. 1, 1934, Commerce building, Columbus, O.

Saw and steel products, Feb. 20, 1934, 12 South Twelfth street, Philadelphia.

Scrap iron, etc., March 26, 1934, 11 West Forty-second street, New York.

Screw machine products, May 8, 1934.

Sewing machine, April 30, 1934.

Shipbuilding and repairing, Aug. 5, 1933, 11 Broadway, New York.

Shoe machinery, April 16, 1934.

Shovel, dragline and crane, Nov. 20, 1933, care of J. H. Watters, Marion, O.

Small arms and ammunition, April 2, 1934.

Special tool, die, etc., Nov. 22, 1933, 7016 Euclid avenue, Cleveland.

Steam heating equipment, Feb. 26, 1934, 183 Madison avenue, New York.

Steel casting, Nov. 13, 1933, 420 Lexington avenue, New York.

Steel joist, Sept. 1, 1934, Steel Joist institute, Chicago.

Steel plate, fabricating, April 16, 1934.

Steel tire, May 4, 1934.

Steel tubular and firebox boiler, Nov. 16, 1933, care of R. A. Locke, Middletown, Pa.

Steel wool, March 10, 1934, 7 East Forty-fourth street, New York.

Stone finishing machinery and equipment, Dec. 26, 1933, Masher and Lippincott streets, Philadelphia.

Structural steel and iron, July 11, 1934, (stayed on approval), American Institute of Steel Construction Inc., New York.

Textile machinery, Oct. 16, 1933, 38 Chauncy street, Boston.

Valve and fittings, Dec. 20, 1933, 420 Lexington avenue, New York.

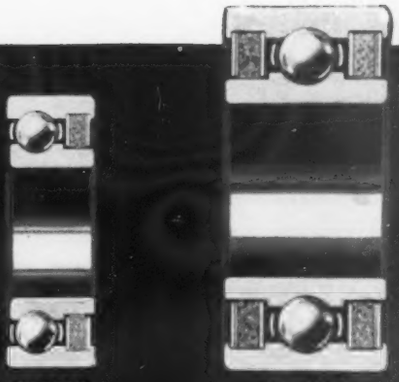
Warm air furnace, Dec. 11, 1933, 51 Broad street, Columbus, O.

Washing and ironing machine, Nov. 6, 1933, 80 East Jackson boulevard, Chicago.

Wholesaling (basic code), Jan. 22, 1934, 570 Seventh avenue, New York.

Wire rod and tube die, Feb. 11, 1934, 31 Nassau street, New York.

Wrenches, April 14, 1934, 1 Wall street, New York.



SELF-SEALED

Out of their experience of more than 23 years, NORMA-HOFFMANN engineers — pioneers in the design of enclosed and self-protected bearings —have developed and patented a range of types which meets practically every bearing condition and which affords the mechanical world

The Most Complete Line of SELF-PROTECTED BEARINGS in America

The "GREASEAL" Series of Felt-Protected Ball Bearings—in the three types illustrated above—is marked by the following outstanding features which make for better performance and more lasting satisfaction:- thick, closely-fitting felts between removable plates forming an effective labyrinth against the recessed inner ring - - - FELT SEAL REMOVABLE in its entirety for inspection, cleaning or renewal of grease - - - wide, solid inner and outer rings, with maximum contact on shaft and housing, make inserts in housing unnecessary and militate against slippage, looseness, and escape of lubricant past outer ring - - - felt seal within confines of both rings and not exposed to injury - - - seal construction avoids race distortion, assuring dimensional exactness and quiet running - - - grease capacity ample for long periods of service. . . . . Eight other types of Self-Protected PRECISION Bearings are here pictured and indexed. Write for the complete Catalog. Let our engineers aid you in selection and application.

NORMA-HOFFMANN BEARINGS CORPN.

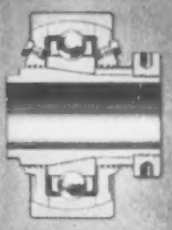
STAMFORD, CONN., U. S. A.

Type P—Closed type ball bearing with one grease - retaining plate.

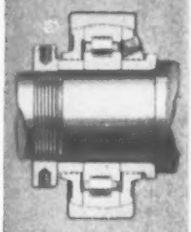
Type PP — closed type ball bearing with two grease - retaining plates.

Type GS — "Greaseal" felt - protected, grease - packed ball bearing.

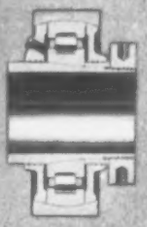
Type EGS — Adjustable, felt - protected, grease - packed ball bearing.



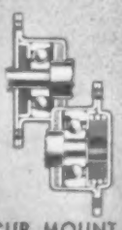
Type LTW — Self - aligning ball bearing with swiveling grease - retaining side plates and adapter sleeve.



Type RLSW — Self - aligning roller bearing with swiveling grease - retaining side plates.



Type RLTW — Self - aligning roller bearing with swiveling grease - retaining side plates and adapter sleeve.



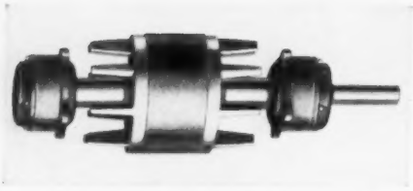
CUP MOUNTING — Designed to use with small open type ball bearings in high-speed devices; furnished as complete units.

"NORMA-HOFFMANN"

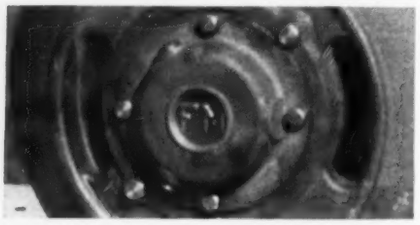
PRECISION BEARINGS

BALL, ROLLER AND THRUST

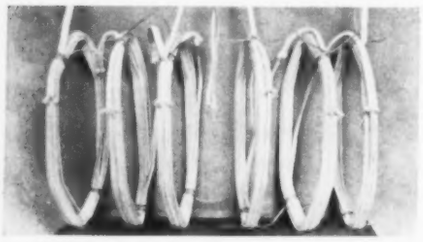
BOTH GUARD



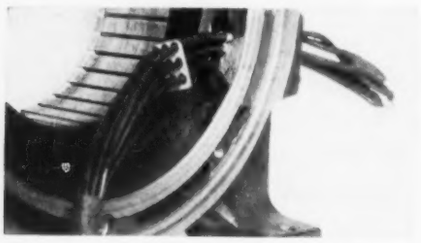
Complete rotor assembly with cartridge-type sealed ball bearings. Note the one-piece rotor winding.



Ball bearings need only yearly lubrication with tube-contained lubricant. Dust-tight bearings. No lubrication drip.



Coils are group wound. An entire phase group is a single piece of wire—lead connections from each group are *welded*—not soldered or brazed.



Leads are sealed in through frame opening—and anchored permanently. No chance for strain on field leads.

Motors built to the world's most exacting standards

Setting new and higher standards in motor construction and performance is a responsibility Fairbanks-Morse takes seriously.

Fairbanks-Morse was the *first* to pioneer ball bearing motors . . . one-piece rotor construction . . . grease tube lubrication and a host of other improvements—all major contributions to the art of building motors. Mechanical excellence *plus* electrical performance *plus* sound engineering—that's the Fairbanks-Morse standard to which its motors are built.

We invite you to investigate for yourself the *extra* features built into F-M Motors. Address Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Illinois. 32 Branches at Your Service Throughout the United States.

Self-locking slot insulation — permanent and additional protection for field windings.

Final vibrometer test. One of a series to insure a smooth-running motor with minimum vibration.

Pioneer Designers and Manufacturers of POWER, PUMPING AND WEIGHING EQUIPMENT 104 Years

FAIRBANKS MOTORS AND

THE *profits!*

Scales that set the world's accuracy and dependability standards

Perhaps you have never considered the raw materials and finished production goods moving through your plant as so much cold cash.

Is an inaccurate scale or careless operator causing you a steady loss on "short" or "long" weight? However accurate your scale mechanism may be, it cannot compensate for human error.

Fairbanks pioneering in scales now brings you an accurate *printed* check on every scale operation. An ingenious device automatically prints a ticket showing not only the weight, but any other preset information pertaining to the operation, such as date, etc.

Inquire about this important new scale development. In some spot in *your* plant, it may quickly save you heavy losses through overweight, underweight and in material handling. For full information write Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. And 40 principal cities—a service station at each house.

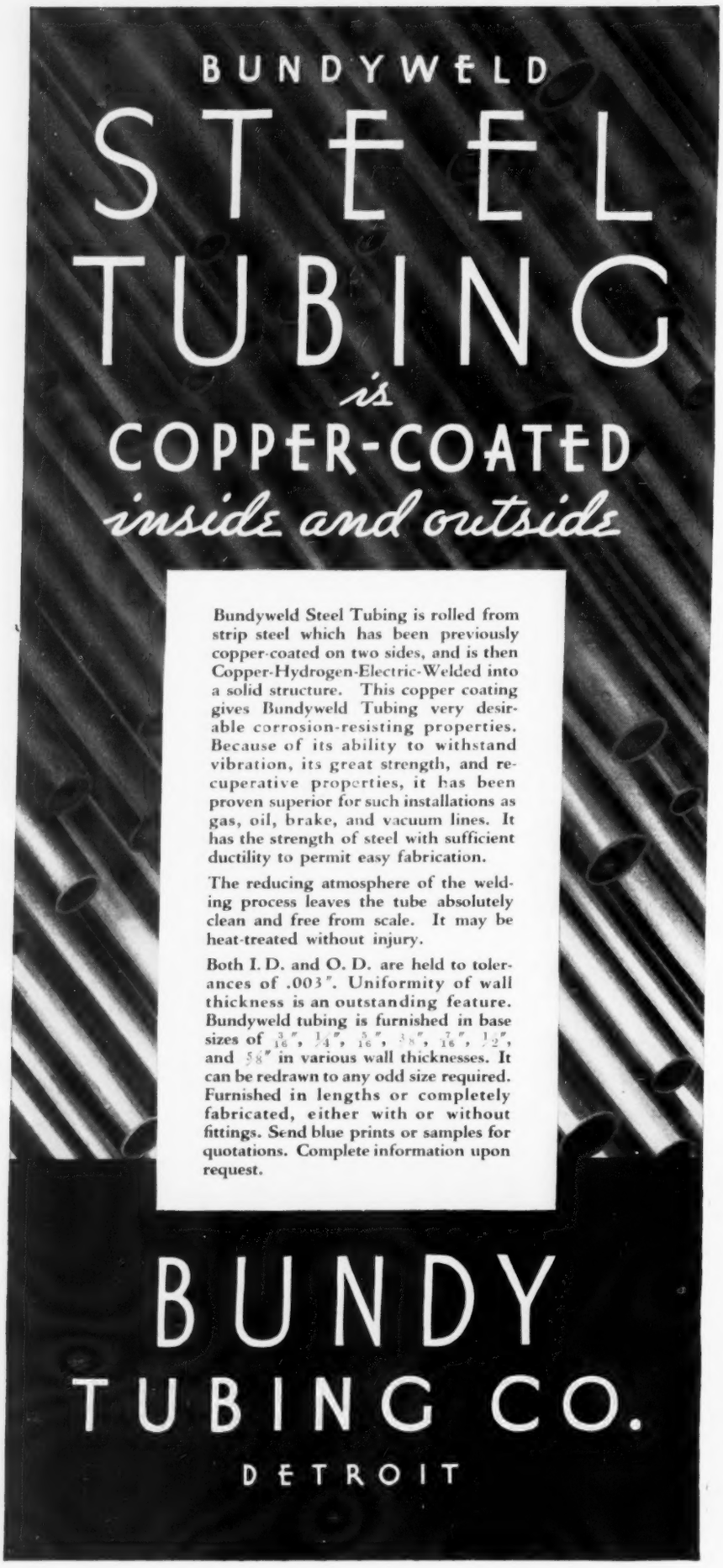
This printing mechanism automatically delivers a printed weight ticket containing both the weight and any other desired pre-set information relating to the operation performed.

-MORSE
SCALES

PREFERRED THE WORLD OVER

FAIRBANKS SCALES

6228-ESA 40.14


BUNDYWELD
STEEL
TUBING
is
COPPER-COATED
inside and outside
Bundyweld Steel Tubing is rolled from strip steel which has been previously copper-coated on two sides, and is then Copper-Hydrogen-Electric-Welded into a solid structure. This copper coating gives Bundyweld Tubing very desirable corrosion-resisting properties. Because of its ability to withstand vibration, its great strength, and recuperative properties, it has been proven superior for such installations as gas, oil, brake, and vacuum lines. It has the strength of steel with sufficient ductility to permit easy fabrication.
The reducing atmosphere of the welding process leaves the tube absolutely clean and free from scale. It may be heat-treated without injury.
Both I. D. and O. D. are held to tolerances of .003". Uniformity of wall thickness is an outstanding feature. Bundyweld tubing is furnished in base sizes of 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", and 5/8" in various wall thicknesses. It can be redrawn to any odd size required. Furnished in lengths or completely fabricated, either with or without fittings. Send blue prints or samples for quotations. Complete information upon request.
BUNDY
TUBING CO.
DETROIT

Bars

Bar Prices, Page 224

Pittsburgh — Heavier automotive buying of bars is taking place, most material being for nearby delivery. Forging quality carbon bars and alloy grades are obviously sharing in the betterment. Several farm implement manufacturers also continue to issue frequent bar specifications. The market is firm at 1.80c, Pittsburgh, on carbon bars and 2.45c, Pittsburgh, for alloy.

Cleveland — Demand is well sustained, with automobile forging shops releasing most specifications. Shipments to agricultural implement manufacturers also are holding up, and some builders of excavating machinery have ordered more material.

Chicago — Activity in bar sales and specifications during late December have carried over into January, with signs of a further increase. Automotive and farm implement requirements lead. Miscellaneous buyers are expected to be more active in the market, both to bolster reduced inventories and to accommodate anticipated betterment in consumption.

Boston — Commercial steel bar buying is light. Buyers indicate they will order moderately during first quarter. For the manufacture of 3-inch die lock chain, 223 tons of hot-rolled nickel steel round bars, grade V, have been placed for the Boston navy yard.

Philadelphia — Demand for commercial steel bars is stimulated by slightly better releases by jobbers and bolt and nut makers. Consumer buying seems to be for actual needs rather than for stock. Cold-drawn specifications are well maintained.

Plates

Plate Prices, Page 224

Pittsburgh — Shell Oil Co. is reported planning to begin moving petroleum products on the Mississippi and tributaries. It recently chartered six barges, four of tank type, to ship gasoline from New Orleans. Inquiry for river barges continues to be delayed, but there still is promise for early orders on several tank-type floating units.

Cleveland — Some fabricators of industrial equipment report more inquiries, but plate specifications are restricted to occasional small lots.

This Symbol

is recognized today, as for generations, as the mark of

WORTHINGTON

AIR COMPRESSORS
ROCK DRILLS AND AIR TOOLS
DIESEL ENGINES
GAS ENGINES
STEAM CONDENSERS
FEEDWATER HEATERS
CENTRIFUGAL PUMPS
STEAM PUMPS
POWER PUMPS
DEEP WELL PUMPS
V-BELT DRIVES
LIQUID METERS
REFRIGERATION EQUIPMENT

. . . and is accepted as assurance of dependable equipment and cooperative service in the industrial, power and construction fields throughout the world.

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General Offices: **HARRISON, NEW JERSEY** - *Branch Offices or Representatives in Principal Cities throughout the World*

NRA CODE A-356

WORTHINGTON

ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND DALLAS DENVER DETROIT EL PASO HOUSTON KANSAS CITY
LOS ANGELES NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS ST. PAUL SAN FRANCISCO SEATTLE TULSA WASHINGTON

The Cleveland plate mill was idle last week.

Chicago — Moderate lots of plates are required for the several Mississippi dams on which contracts have been placed. A local fabricator will furnish 450 tons for a water main in Oklahoma. Other plate needs for structural purposes are light, and miscellaneous outlets still provide only small tonnages. Railroad requirements continue poor.

Boston—Heavier specifications for railroad plate requirements are expected this month. Current buying is light, of miscellaneous character and in small lots. Prices hold at 2.20c, Boston.

Philadelphia — Prospective plate work includes tonnage for two barges of 7000 barrels capacity for the Sun Oil Co., Philadelphia.

San Francisco—Awards are confined to small lots. Bookings for 1934 totaled 62,671 tons, compared with 53,638 tons for 1933. Bids will be taken Jan. 8 for 63,000 feet of welded steel pipe for the Los Angeles aqueduct.

Contracts Placed

4000 tons, Malheur and Dead Ox siphons, Owyhee project, Oregon and Idaho, to unnamed interests; Consolidated Steel Corp., Los Angeles, general contractor.

450 tons, water main, Shawnee, Okla., to Taylor Forge & Pipe Works, Chicago.

425 tons, pipe, Ft. Peck, Mont., dam, to McClintic-Marshall Corp., Bethlehem, Pa.

THE ski-jumper, flashing down the long incline with accelerating speed, leaves the take-off like a human bullet and soars through the air with skill, balance and stamina to a perfect landing.

You will find similar displays of speed duplicated in industry. Ultra-Cut Steel, a well balanced grade of high sulphur Bessemer, accelerates the production of automatic screw machines 30% to 40% or more. It gives greater stamina to machine parts and insures a finer finish—exemplifying the skill of B & L engineers in developing machinability to the utmost.

Other performance records are given in the new Ultra-Cut Folder No. 3-S. Ask for your copy.

BETTER MADE STEELS LABORATORY TESTED

ULTRA-CUT STEEL

was substituted for SAE 1112 in fabricating this connector with a resultant increase of 45% in output, from 55 to 80 pieces per hour—and tool life doubled!

COLD DRAWN BARS AND SHAFTING
FREE-CUTTING SCREW STOCK
EXTRA WIDE FLATS SPECIAL SECTIONS ALLOY STEELS

BLISS & LAUGHLIN, INC.

HARVEY, ILL. *Sales Offices in all Principal Cities* BUFFALO, N.Y.

Sheets

Sheet Prices, Page 224

Pittsburgh—Advances in sheet mill operations placed the average for the industry last week at a strong 55 per cent rate, which is strongly supported by full-finished sheet demand from the automobile industry. However, the market has some well-diversified miscellaneous sheet business, and buyers of common black sheets are numerous. Base prices are unchanged, but considerable discussion centers over application of of some extras.

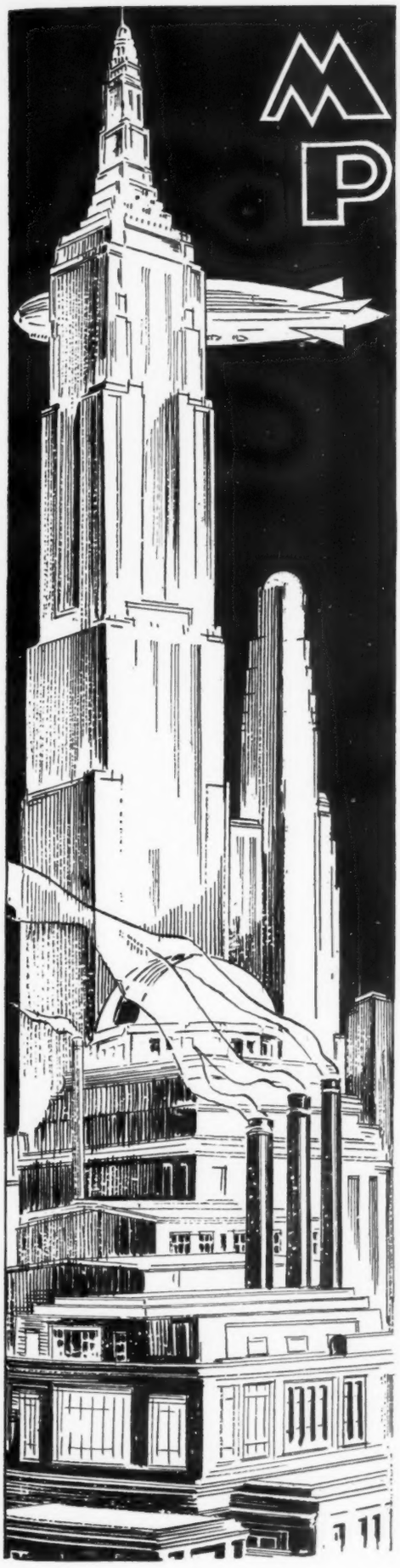
Cleveland—Demand from the automobile manufacturers continues strong, with 85 to 90 per cent of current output in this district now being shipped to that industry. Despite the shorter week specifications increased. Some mills are beginning to defer deliveries.

Chicago—Automotive needs continue outstanding and mills are faced with capacity operations for six weeks on cold-rolled material. Several other sheet consuming industries also are active. Refrigerator manufacturers are seasonally busy, while needs of farm implement builders are substantially better than in the corresponding period of the past several years. Miscellaneous specifications gradually are increasing.

Boston—Low stocks of sheets held by consumers indicate a broader demand early this quarter, some buyers having already specified shipments on new business. A Boston district builder of air conditioning equipment has booked a large railroad order and has a heavy backlog.

Philadelphia — Sheet buying is moderate, with automotive body material more active.

Cincinnati—Demand for sheets the past week surged upward. Most of the increase is for automobile manu-



MODERN PRODUCTS

for the modernization of Industrial Drives

Profits, today, depend largely upon low production costs. One sure way of lowering these costs is to operate with only the modern and efficient types of machinery. Equally important is the use of modern methods of driving this equipment.

The Philadelphia MotoReduceR is the ultimate in machinery drives. It combines in one compact housing the motor and speed reducer. Built in both horizontal and vertical types, the MotoReduceR is adaptable for driving all types of equipment. These units require no base plate or coupling between motor and reducer. Their compactness and ease of installation permit their being made an integral part of the machine itself.

Write us for further details about the MotoReduceR.

We also make a complete line of WORM GEAR SPEED REDUCERS to meet every right angle drive requirement. These Units eliminate high cost low speed motors, allow great reductions in R.P.M. and require the very minimum of attention.

To take care of heavy loads at high speeds and to resist severe shocks, as frequently encountered in the Metal Making and Metal Working Industries, the complete line of PHILADELPHIA HERRINGBONE UNITS (with continuous "Sykes" tooth form) are widely used and recommended.

Write for information regarding both the Worm Gear and Herringbone Gear Units.

Philadelphia Horizontal MotoReduceR

Philadelphia Worm Gear Reducer

Philadelphia Herringbone Speed Reducer

PHILADELPHIA GEAR WORKS

Industrial Gears and Speed Reducing Units

Main Office and Works—Erie Ave. and "G" St., Philadelphia, Pa.

New York—330 W. 42nd St. Pittsburgh—Chamber of Commerce Bldg.

facturers, although refrigerator manufacturers indicate optimism for heavy sales the next few months. Ordering is for prompt shipment. Backlogs of mills are unimpressive.

Buffalo—Sheet mills are operating at 40 to 50 per cent and are well scheduled for January. The outlook for first quarter is regarded as good.

Birmingham, Ala.—Production is steady and shipments prevent any accumulation of stock. Better feeling is noted on turn of year as agricultural sections become now active.

Transportation

Track Material Prices, Page 225

Norfolk & Western, following its recent inquiry for 32,000 tons of 131-pound rails, will open bids Jan. 8 for 12,600 kegs of spikes, half to be delivered in February, remainder in March; Jan. 16 on 1,030,000 tie plates and 6000 steel riser plates; for a coal pocket foundation at Lambert Point, Va.

Seaboard Air Line has distributed 586,000 tie plates between Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., Bethlehem Steel Co., Bethlehem, Pa., Republic Steel Corp., Youngstown, O., and Wheeling Steel Co., Wheeling, W. Va. The same road is expected momentarily to place its first quarter requirements of plates, shapes and bars for first quarter.

Interstate railroad, Philadelphia, is inquiring for repairs to 150 coal cars. Chesapeake & Ohio has distributed orders for 1500 tons of car repair parts.

Locomotives Placed

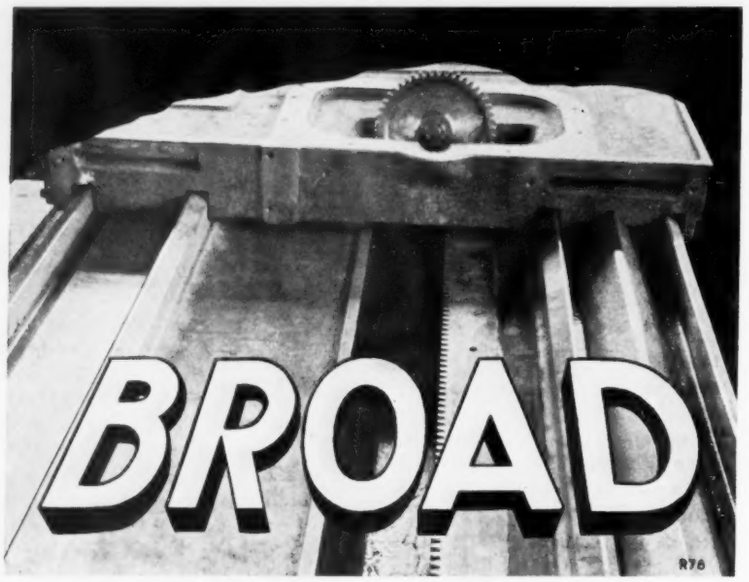
Atchison, Topeka & Santa Fe, one 600-horsepower diesel switching locomotive, to American Locomotive Co., New York.

Car Orders Pending

Chesapeake & Ohio, 40 steel gondolas, in addition to 10 recently placed; bids asked

Locomotives Pending

Elgin, Joliet & Eastern, one to five diesel-electric locomotives, contemplated.



ARE THE

WAYS

Plenty of bearing surface, isn't there? Ample distance between them too. What's more they are force feed lubricated with filtered oil and have chilled surfaces.

And for what purpose? Why to give the massive Landis Type 30 Roll Grinder wheel carriage all the support it could possibly require. Vibration is thereby minimized. All overhang is eliminated. The wheel imparts a superior finish to the roll.

You must use a Landis to completely appreciate what this feature means in terms of results. See one of these machines on your own desk—through the medium of catalog H-301. 180

LANDIS TOOL CO.
WAYNESBORO, PA.

Pipe

Pipe Prices, Page 225

Pittsburgh — Lone Star Gas Corp. has been considering construction of a 100-mile gas pipe line in Anderson county, Texas, which it is estimated would require approximately 10,000 tons of steel pipe. However, it will be recalled that this company several months ago built a 76-inch gas line in Texas and used largely reclaimed 12¾-inch line pipe which was reconditioned at Comanchie, Okla., and then installed in the Texas field. Other line pipe inquiry is poor although all pipe discounts and footage prices are firm and unchanged.

Chicago—Prospective business in cast iron pipe is slow to materialize and recent awards have been small. Steel water pipe placed at Shawnee, Okla., involves 450 tons, while 425 tons of plates will be required for a pipe line at the Fort Peck, Mont., dam.

Birmingham, Ala.—Cast iron pressure pipe manufacture was resumed this week after several days shutdown for holidays. Fairly steady

Increase Efficiency

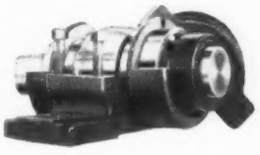
IN POWER TRANSMISSION

with FAFNIRS

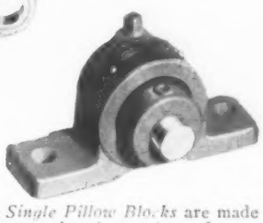
—the Easy Way

FAFNIR *Lineshaft Boxes,* both single and double type in a variety of frames (four-point, two-point, yoke, ball & socket, etc.) to accommodate every service requirement. They are made for all standard shaft sizes.

FAFNIR *Blower and Fan Boxes* are made in both the double knee type and the double and single pillow block types to accommodate every type of blower and fan.

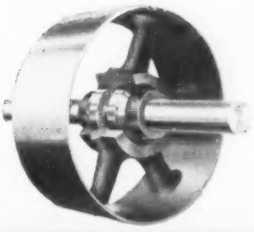


FAFNIR *Double Pillow Blocks* are recommended for use where spans are long and shafts are long in proportion to the load, since they give a longer area of shaft support. The entire box aligns as a unit in the base. Shaft and box can be removed without disturbing the base. A complete line is offered.

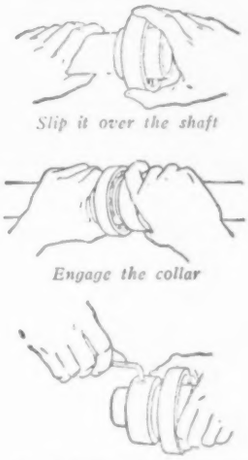


FAFNIR *Single Pillow Blocks* are made with a comprehensive variety of types and seals. They provide the exact characteristics required for practically every application for which a single pillow block can be used successfully.

FAFNIR *Flange Cartridge Unit* provides a very compact unit capable of rapid installation. It is supplied assembled with self-aligning bearings to take care of possible shaft mis-alignment.



FAFNIR *Loose Pulleys* not only provide the savings in power, oil and maintenance which characterize all Fafnir Transmission Equipment but eliminate all special troubles inherent to babbitted loose pulleys. These ball bearing pulleys can be used on machine shafts, countershafts or lineshafts.



Set the screw, and the FAFNIR *Wide Inner Ring Ball Bearing is firmly secured to the shaft. It's as simple as ABC to install, and as efficient in operation as it is simple of operation.*

The highest efficiency in mechanical transmission of power demands friction-free bearings—and industry demands they be varied to meet individual problems, yet easy to install. Fafnir offers a comprehensive variety of performance-proved bearing units for practically every type of service. Through the use of these Fafnir units, industry secures not only savings in power, in oil and in maintenance but also a simplicity of installation which is unequalled.

Select the most efficient power transmission system, then run it on Fafnirs. That's the way to gain lasting, maximum efficiency. . . . THE FAFNIR BEARING COMPANY, *New Britain, Conn.* Atlanta . . . Chicago . . . Cleveland . . . Dallas . . . Detroit . . . Milwaukee . . . Minneapolis . . . New York . . . Philadelphia.

FAFNIR BALL BEARINGS

production is seen during first quarter of year at least.

New York — Cast pipe buying is light and in small lots. New inquiry is also sluggish. A New Jersey utility has bought close to 200 tons, 8-inch and under.

San Francisco — Cast iron pipe bookings, the largest in nearly two months, brought the total for 1934 to 45,831 tons as compared with 40,984 tons in 1933. The largest recent award involved 800 tons for Spanish Fork, Utah, divided between two makers. Movement of standard steel pipe is improving and the prospects for the early part of 1935 are more encouraging.

Cast Pipe Placed

403 tons, 2 to 8-inch, class 150, Parawan, Utah, to unnamed interest.

260 tons, 6 to 16-inch, class 250, San Diego, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

250 tons, 8-inch, class 150, Gunnison, Utah, to unnamed interest.

247 tons, 6-inch, class 150, Centerfield, Utah, to Pacific States Cast Iron Pipe Co., Provo, Utah.

201 tons, Wellington, Utah, to unnamed interest.

Cast Pipe Pending

242 tons, 4 and 6-inch, class 150, Oakland, Calif.; bids Jan. 9.

Steel Pipe Pending

10,000 tons, approximately, 8, 10 or 12-inch, 100-mile gas line from Long lake field in Anderson county, Tex., to Dallas, Tex.; Lone Star Gas Co. has contract from Tidewater Oil Co. and Seaboard Oil Co. for gas production in the new field; may use reclaimed material.

A Plea for Consideration of Old Age Pensions

The present Congress is expected to take up the question of Federal Old Age Pensions. Enactment of such an act would be a momentous step in the social legislation of the country, and every detail should have careful consideration by the Congress.

Thousands of citizens should carefully consider another aspect of relief for the aged and infirm, should meet a situation that cannot be handled by Congress, but only by its constituents—the need for replacement of old, worn-out, obsolete forge shop equipment.

By actual census, hammers have the greatest average age of all classes of machinery. By some odd turn of mind the average opinion seems to be that as long as the ram moves up and down, "it's a hammer, and doing all any hammer can do." It isn't so. Age takes its toll. Wear has resulted in inefficient, wasteful operation. Advances in design and materials have made most hammers obsolete, not profitably productive. You can best utilize your investment in materials, wages, and power, only with Erie Forge Shop Equipment. Retire your aged and infirm: the increased earnings with new Erie equipment will pay the costs.

ERIE FOUNDRY CO., ERIE, PENNA.

Strip Steel

Strip Prices, Page 225

Pittsburgh—Strip steel shipments here in December were the best since June and January seems likely to show further gains. Hot-rolled, however, continues to account for most going tonnage. The market holds at 2.60c, Pittsburgh, for cold strip and 1.85c, Pittsburgh, for hot.

Cleveland—Production in this district continues close to capacity, as automobile manufacturers press for early delivery. In other directions the market for strip is quiet.

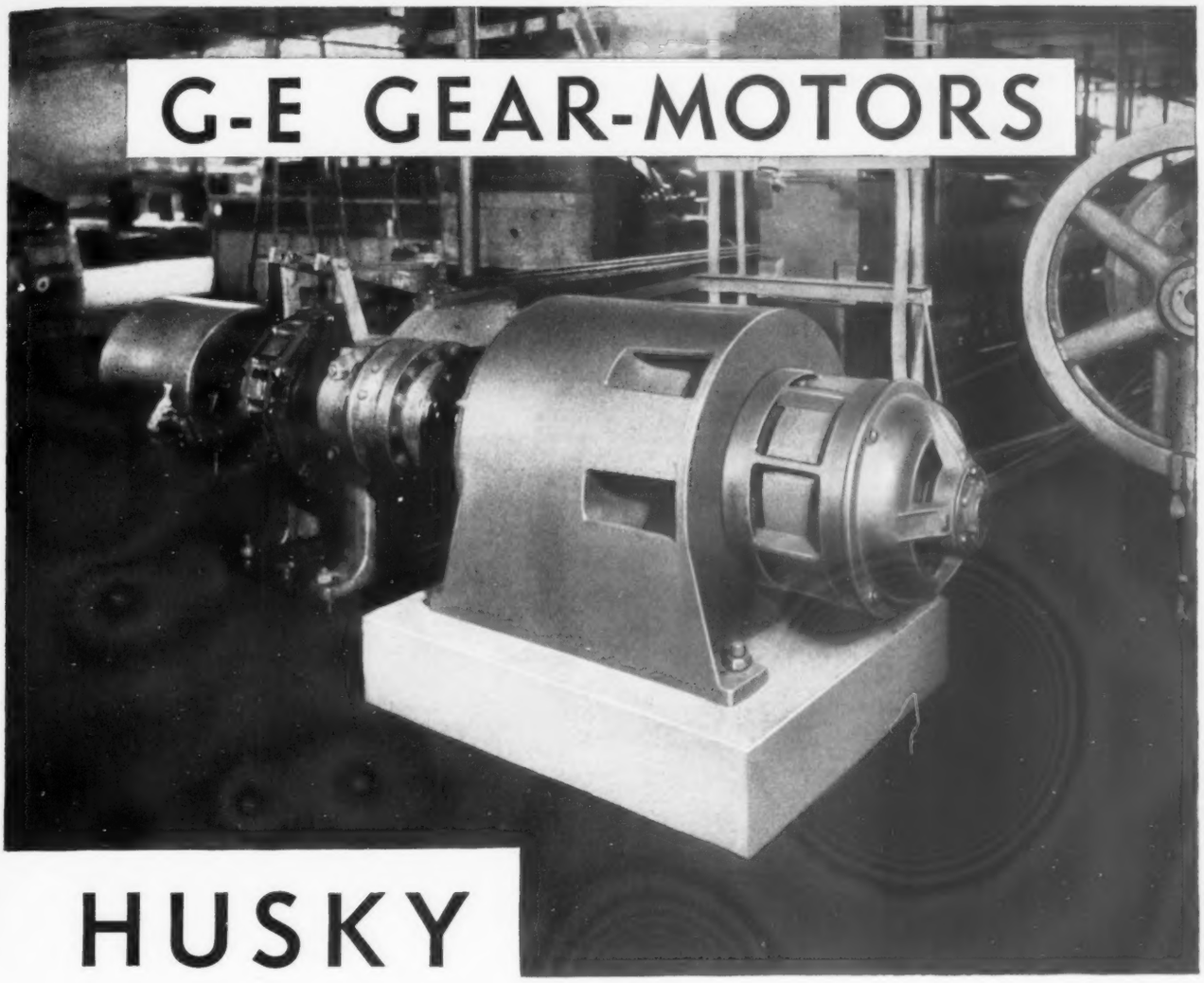
Chicago—Strip demand is receiving its best support from the automotive industry, particularly in cold-rolled material, which is moving at the best rate in nearly six months. Buying outside of the automotive industry usually is for fairly early requirements.

Boston — While there has been some gain in demand for cold strip, the improvement is generally admitted to be less pronounced than in some other districts. Slit sheets continue to compete with strip for some stamping operations especially. Narrow widths are the most active with prices unchanged.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 225

Bolt and nut demand is light following a moderate pickup in December, part of which was accounted for by higher prices effective this quarter. While consumption is rising in the automotive industry and has reached a fairly high rate among farm implement manufacturers, poor requirements of railroads continue a retarding factor. Rivet demand shows little change, with needs of fabricators less active.



HUSKY LOW-SPEED UNITS

For Steel-Mill Service

THERE are dozens of places around steel mills where G-E gear-motors will simplify drive problems and save time and money.

For example, take the draw bench, shown above, which is driven by a 30-hp., 17-rpm. G-E gear-motor. The drive which it replaced did not give a steady draw, and, as a result, small ridges in the tubes could often be detected. The smooth, low-speed power of the G-E gear-motor entirely eliminated this difficulty. Now the tubes are round and uniform.

On leveler screw-downs, on individual roll drives, and on wire-drawing blocks — in fact, wherever you need a compact, efficient, low-speed unit, you'll find it profitable to use G-E gear-motors. They're built to "stand the gaff" of steel-mill service — built to stay on the job year after year with G-E reliability.

G-E gear-motors are available in standard voltages and ratings from 1/6 to 75 hp., from 11 to 600 rpm. Various electrical and mechanical modifications can be supplied to meet your special needs. Write for bulletins GEA-1437B and GEA-1765. Address General Electric, Dept. 6C—201, Schenectady, N. Y.

020-42

GENERAL ELECTRIC

Shapes

Structural Shape Prices, Page 224

New York—More small-tonnage inquiry is active, in addition to 12,800 tons closing this month on pier and west side railroad projects. Several state hospital inquiries close this month and bids are also being taken on a group of sub-postal stations, although the latter require little steel per unit.

Bookings of fabricated structural steel for November, according to reports received by the American Institute of Steel Construction here, showed a 32 per cent gain over October, 11 per cent over the average for the third quarter and 13 per cent over the same month last year. Shipments were 12 per cent less than October and 3 per cent less than the third quarter average, but were 55 per cent larger than November, 1933. The tonnage ahead is about 13 per cent below the backlog this time last year.

James G. Dempsey, Philadelphia, is reported low bidder for the inspection of the structural steel for the New York federal office building, requiring 17,000 tons.

Pittsburgh — Both inquiries and contracts have advanced slightly. McClintic-Marshall Corp., Bethlehem, Pa., will erect 500 tons for Spang, Chalfant & Co.'s tube mill extension, Ambridge, Pa., and another contract in the week was a large order for steel flooring to Reliance Steel Products Co., Rankin, Pa., for six traffic lanes on the new Philadelphia-Camden, N. J., bridge.

Cleveland—For the Lorain road bridge over Rocky river, Cuyahoga county (Cleveland), 3100 tons of shapes have been awarded Fort Pitt Bridge Works, Pittsburgh. State highway commission, Columbus, O., is taking bids Jan. 11 on 150 tons for a battledeck floor bridge in Franklin, Warren county.

Chicago — Structural awards are few, the largest being 3687 tons, including 1400 tons of piling, for the Winona, Minn., dam. The Des Moines, Iowa, post office, recently placed, will take 666 tons of shapes. Bids close this week on the Guttenberg, Iowa, dam requiring 5100 tons. New inquiries include 3900 tons for state bridges, principally in Oklahoma.

Boston—After long delay, 8250 tons has been awarded American Bridge Co., Pittsburgh, for the parcel post building superstructure, Boston.

Philadelphia — Structural buying is light, although prospects are improved. Bids open Jan. 30 on the naval aircraft factory here requiring several hundred tons of shapes and 400 tons of reinforcing bars. Public work is a feature. For the Lafayette bridge, Norfolk, Va., 1290 tons is required, bids Jan. 15; also 350 tons of bars and 175 tons of caissons. A bridge in Sullivan county, Pennsyl-

Liquitol

Reduces
INGOT COSTS

What is LIQUITOL?

A scientifically prepared fine dry powder which insures sound iron castings, sound steel castings and sound steel ingots.

LIQUITOL retards Cooling of hot-top metal. Working on the theory that secondary piping is caused by occluded gases, it follows that if the hot-top is kept open longer gases have a better chance to escape.

Why is LIQUITOL *used?*

Eliminates piping in castings and ingots.

Heads reduced 40%.

Castings are structurally more perfect.

Cavities and porosities practically eliminated. Scrap heads and runners are greatly reduced. Better fluidity of molten metal during cooling. Additional feeding of heads reduced, thus prevents waste.

Does not injure or affect physical or analytical properties of steel or cast iron in any way.

Where intermittent feeding is practiced there is absolutely no possibility of LIQUITOL being carried into ingot or casting

Does not solidify but forms a fusible coating which can be disturbed for observation. Additional metal can be poured through LIQUITOL without danger of LIQUITOL entering body of ingot or casting.

LIQUITOL saves its cost many times, due to sounder ingots and castings you secure through its use.

Ask for Bulletin AL 16A

THE ALPHA-LUX COMPANY, INC.
192 Front St.
NEW YORK CITY
Branches: Philadelphia - Chicago

Shape Awards Compared

	Tons
Week ended Jan. 5	25,323
Week ended Dec. 29	7,855
Week ended Dec. 22	13,498
This week in 1934	14,961
Weekly average, 1934	16,284
Weekly average, 1935	25,323
Weekly average, December	9,078
Total to date, 1934	14,961
Total to date, 1935	25,323

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for anything and everything needed in

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WELDING

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With OFFICES and PLANTS in the important centers of the country, AIRCO offers to all users of welding and gas cutting, a service that is complete and satisfying from every angle. Go to AIRCO for your answer to any question pertaining to welding and gas cutting, for your equipment, apparatus and supplies, for practical aid in training your welders and cutters, and for full engineering co-operation on any welding or gas cutting problem.

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OXYGEN, ACETYLENE
NITROGEN, HYDROGEN

•

WELDING and CUTTING
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OXYGEN and ACETYLENE
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PORTABLE WELD TESTING MACHINE
for Tensile and Bend Tests

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ELECTRIC WELDING MACHINES
ELECTRIC WELDING RODS

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STOODY PRODUCTS for HARD FACING

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The LOW MELTING POINT
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Represented in Texas by Magnolia Airco Gas Products Co., Houston, Beaumont, Wichita Falls, El Paso, Fort Worth and San Antonio
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NRA

A NATION-WIDE WELDING and CUTTING SUPPLY SERVICE

vania, will take 265 tons, and two in Tioga county 125, bids Jan. 11. For a Pennsylvania state bridge in Montgomery county, Pennsylvania, 225 tons is needed; James McGraw Co., Philadelphia, has been awarded the general contract.

San Francisco — Although more than 25,000 tons of structural material is either up for figures or pending, awards for the week totaled less than 500 tons. During the year 1934 143,365 tons were placed, compared with 258,832 tons for the previous year.

Seattle—The United States engineer, Portland, Oreg., has received tenders for a span to cross the Bonneville, Oreg. dam locks, requiring 125 tons of shapes and machinery. Award is pending.

Shape Contracts Placed

8250 tons, superstructure, parcel post building, south station, Boston, to American Bridge Co., Pittsburgh, Great Lakes Construction Co., Chicago, general contractor.

3687 tons, dam, Winona, Minn.; 2287 tons fabricated steel to McClintic-Marshall Corp., 1400 tons piling to Bethlehem Steel Co. Bethlehem, Pa. United Construction Co., Winona, general contractor.

3100 tons, state bridge over Rocky river, Cuyahoga county, Ohio, to Fort Pitt Bridge Works, Pittsburgh.

1750 tons, state highway bridge over Des Moines river, Ottumwa, Iowa, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

1600 tons, addition to building, University of Texas, Austin, Tex., to Mosher Steel & Machinery Co., Dallas, Tex.

800 tons, viaduct, Des Moines river, Ottumwa, Iowa, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

666 tons, postoffice, Des Moines, Iowa, to Hansell-Elcock Co., Chicago; Hanson Bros. Co., Chicago, general contractor.

790 tons, municipal pier No. 38, New York, to American Bridge Co., Pittsburgh.

630 tons, police headquarters building, Buffalo, to R. S. McManus Structural Steel Co., Buffalo.

510 tons, bridge, Lake county, Indiana, to Mississippi Valley Structural Steel Co., Decatur, Ill.

500 tons, state highway bridge, Hartsdale, Ind., to Mississippi Valley Structural Steel Co., Decatur, Ill.

500 tons, tube mill extension, Ambridge, Pa., for Spang, Chalfant & Co. Inc., Pittsburgh, to McClintic-Marshall Corp., Bethlehem, Pa.

460 tons, Pennsylvania state bridge, Tioga county, to American Bridge Co., Pittsburgh, through Graham Construction Co., Lancaster, Pa.

450 tons, bridge, Benton county, Vinton, Iowa, to Clinton Bridge Works, Clinton, Iowa.

270 tons, addition to Tribune building, New York, to George A. Just Co., Long Island City, N. Y.

270 tons, state highway bridge, Alma, Wis., to Milwaukee Bridge Co., Milwaukee.

210 tons, coal pocket, One Hundred and Thirty-eighth street and Harlem river, New York, to Capital Structural Steel Co., New York, reported last week to another interest; Weatherly Steel Co. to fabricate.

210 tons, state highway bridge, Belton, Tex., to Austin Bros., Dallas, Tex.

190 tons, building, Cumberland, Md., for Celanese Corp., to McClintic-Marshall Corp., Bethlehem, Pa.

160 tons, warehouse and evaporator building, Diamond Salt Co., St. Clair, Mich., to Whitehead & Kales Co., Detroit.

130 tons, building addition, Gordon Baking Co., Long Island City, N. Y., to National Bridge Works, Long Island City.

100 tons, transit shed extension, Los Angeles, to Pacific Coast Steel Corp., Los Angeles.

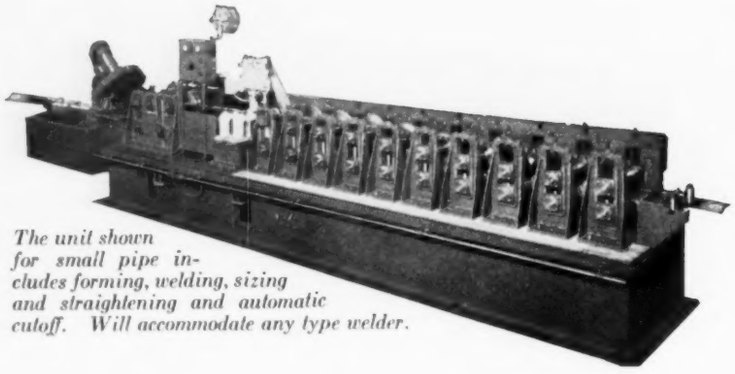
100 tons, sheet piling, highway work, Los Angeles county, California, to unnamed interest.

100 tons, Lemon Creek bridge, Alaska, to unnamed interest.

100 tons or more, school, Westbury, N. Y., to George A. Just Co., Brooklyn, N. Y., William Kennedy Construction Co., general contractor.

(*Please turn to Page* 249)

YODER
MILL EQUIPMENT



The unit shown for small pipe includes forming, welding, sizing and straightening and automatic cutoff. Will accommodate any type welder.

We build a complete line of Rotary Shears, Automobile Metal Working Machines, Metal Forming Machines and Electric Welded Pipe Equipment. Also Steel Mill Equipment including Decoilers, Slitters, Edge Conditioners, Roller Levelers, Recoilers, Automatic Cutoffs, Roller Tables, etc.

Consult our engineers on your sheet or plate problems

THE YODER COMPANY
W. 55 ST. and WALWORTH AVE. CLEVELAND, OHIO
PLATE AND SHEET METAL MACHINERY SPECIALISTS

(*Concluded from Page* 244)

Unstated tonnage, high school, Tewksbury, Mass., to Bethlehem Fabricators Inc., Bethlehem, Pa.

Shape Contracts Pending

1500 tons, Hampton boulevard bridge, Norfolk, Va., for city.

1250 tons, state bridges, Kansas.

1000 tons, gantry crane, Mare Island, Calif.; bids Jan. 16.

800 tons, state bridge, Idabel, Okla.

650 tons, combination highway bridge and railroad bridge, Myrtle Bridge, S. C., for United States engineer corps.

550 tons, state bridge, Urbana, Ill.

547 tons, state bridge, Pompton river, route 23, section 12C, Passaic-Morris, counties, New Jersey. Tidewater Stone & Supply Co., Hackensack, N. J., general contractor.

500 tons, state highway bridge, Havana, Ill.

425 tons, state bridges, Oklahoma.

375 tons, state bridge, Carnegie, Okla.

375 tons, state bridge, Turpin, Okla.

350 tons, public school 146, New York; bids Jan. 9.

265 tons, 2439-foot through truss bridge, Sullivan county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Jan. 11. This job also includes 52,048 pounds of plain steel bars.

200 tons, for addition to Clopay Corp. building, Cincinnati. Bids on general contract are in.

180 tons, state highway bridge, Shirland, Ill.

125 tons, state bridge, Kingfisher, Okla.

100 tons, 85 tons of fabricated structural steel and 15 tons of plain steel bars, 1450-foot pony truss bridge, Middlebury township, Tioga county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Jan. 11.

Wire

Wire Prices, Page 225

Pittsburgh — Several jobbers of wire products who had remained out of the market are now lending promise of early buying. Shipments of spoke and spring wire and rods for automobile parts makers have been distinctly better. The market is unchanged on the basis of 2.30c for common wire and 2.90c for high-carbon spring wire.

Chicago — Demand for manufacturers' wire and wire products continues active. Shipments to automotive interests continue to rise and changes in requirements of miscellaneous users generally are for the better. Movement of wire products shows little change but some additions to jobbers' stocks are looked for this month. New business generally is for early needs.

Boston — Releases for shipment on recent incoming business increased last week with some improvement in well-spread new buying. December bookings with most producers were heavier than shipments, but with inventories completed, this volume is beginning to move. There has been a notable gain in demand for wire for manufacturing requirements.

Cleveland—Considerable tonnage deferred by consumers until after inventories has been released and mill shipments increased. Jobbers are replenishing stocks, especially in fencing and other materials for agricultural requirements.

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Reinforcing

Reinforcing Bar Prices, Page 225

Chicago—Awards, which generally are light, include 310 tons for the Winona, Minn., dam. A taxpayer's suit is delaying action on the Ottumwa, Iowa, bridge involving 800 tons. Contractors are slow to place bar orders for Illinois highway work but about 1500 tons will be purchased during coming weeks.

Cleveland—Fort Pitt Bridge Works, Pittsburgh, was awarded 300 tons of concrete bars for the Lorain road bridge over Rocky river, Cuyahoga county (Cleveland), in connection with 3100 tons of shapes. Bids go in early this month on 1500 tons for the Muskingum, Ohio, conservancy district, Zanesville, O.

Pittsburgh—Award of several thousand tons of new billet steel reinforcing bars for southern housing work at Richmond, Va., and Atlanta, Ga., is awaited, as general contractors have been named. Small lots continue fairly prominent in new inquiries.

Boston—Award of a fair volume of reinforcing bars is expected shortly, including approximately 600 tons for the parcel post building, Boston.

New York—New inquiry for reinforcing steel includes 225 tons for New Jersey highways, and several hundred tons for New York Central projects, west side, Manhattan. General contracts have been placed for New Jersey highways and bridges, taking close to 1500 tons.

Philadelphia—New inquiry includes 150 tons for two New Jersey state road projects, bids opening Jan. 14, and 200 tons for Pennsylvania state road work, bids on half of which were opened Jan. 4 and the remainder on Jan. 11. J. A. Jones Construction Co., Charlotte, N. C., has been awarded the $500,000 parcel post building at Richmond, Va., requiring a substantial tonnage of bars.

San Francisco—Awards during the week did not exceed 500 tons. Bookings for 1934 were the largest in the history of the Pacific coast, aggregating 118,725 tons as compared with 79,356 in 1933. The general contract for the Monrovia and Pasadena tunnels for Los Angeles, involving 6000 tons, has been awarded. Interest centers on 3500 tons for Moffat tunnel, Colorado, bids on which will be opened on Jan. 16.

Seattle—Pending business does not exceed 500 tons, of which 300 are involved in state highway work and 200 for Seattle's city light building. Seasonal influences are apparent and business is slack.

Reinforcing Steel Awards

310 tons, dam, Winona, Minn., to Kalman Steel Corp., Bethlehem, Pa.

300 tons, state bridge over Rocky river, Cuyahoga county, Ohio, to Fort Pitt Bridge Works, Pittsburgh.

128 tons, debris dam at Glendale, Calif., for Los Angeles county, to unnamed interest.

Concrete Awards Compared

	Tons
Week ended Jan. 5	938
Week ended Dec. 29	2,624
Week ended Dec. 22	1,618
This week in 1934	3,257
Weekly average, 1934	4,084
Weekly average, 1935	938
Weekly average, December	2,408
Total to date, 1934	3,257
Total to date, 1935	938

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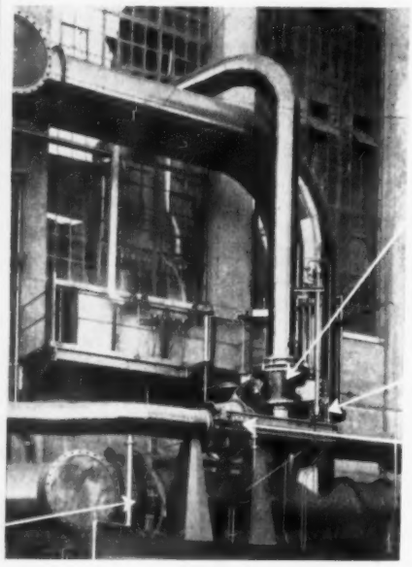

Single and Three Tube Thermal Valves as installed in Vertical and Horizontal Gas Mains

American Open Joint Checker
American Steel Stove Bottom
American Cold Blast Valve
American Chimney Valve
American Safety Cinder Notch Stopper
Blast Furnace Mixer & Drop Valve
American Mixer & Check Relief Valve
American Pig Releaser for Pig Casting Machines
American Gas Seal for Gauge Rods
American Ladle Skulling Hook
Vreeland Pug Mill Equipment
American Sintering Plant Pug Mill
American Water Metering Method for Blast Furnace Skip Car Charge

THE THERMAL EXPANSION GAS VALVE

Single Tube Type—Sizes 12″ to 48″ diameter.
Either Standard Goggle Type or Totally Enclosed.
Three Tube Type—Sizes 36″ to 120″ diameter.

Both Types are manufactured for Electrical or Steam Operation

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169 tons, bridge in Okanogan county, Washington, to unnamed interest.
100 tons, state bridge RC 3596, Broome county, New York, to Strope Steel Co., Albany, N. Y., M. R. Ingraham Inc., Albany, general contractor.

Reinforcing Steel Pending

6000 tons, Monrovia and Pasadena tunnel, Los Angeles; general contract placed.
3500 tons, Moffatt Tunnel, Colo.; bids Jan. 16.
3250 tons, contract 15 and 15-A, San Francisco - Oakland bridge; San Francisco; Healy Tibbits Construction Co., San Francisco, low.
625 tons, piers, Triboro bridge, Little Hell Gate and Randalls Island, New York; to be readvertised.
475 tons, O'Shaughnessy dam enlargement, San Francisco; bids postponed until Jan. 24.
375 tons, state highway, route 2, sections 8A and 7A, Bergen county, New Jersey, George M. Brewster & Son Inc., Bogota, N. J., general contractor.
360 tons, state highway, Route 23, sections 12B and 12C, Morris and Passaic counties, New Jersey, J. P. Burns, Dumont, N. J., general contractor.
300 tons, state highway work, Washington; bids in.
255 tons, state highway, route 2, section 8B, Bergen county, New Jersey, S. J. Groves & Sons Co., Ridgefield, N. J., general contractor.
225 tons, state highways, route 23, section 14, Passaic county, and route 31, section 4A, Somerset county, New Jersey; bids Jan. 14 at Trenton, N. J.
200 tons, school, 4131 South Vermont avenue, Los Angeles; bids soon.
160 tons, state bridge, Pompton river, route 23, section 12C, Passaic-Morris counties, New Jersey, Tidewater Stone & Supply Co., Hackensack, N. J., general contractor.
150 tons, city light building, Los Angeles; plans completed.
145 tons, track depression, west side, Manhattan, New York city; bids to New York Central railroad.
127 tons, overpass over Erie railroad, route 23, section 12B, Pompton Plains, N. J. Franklin Contracting Co., Newark, general contractor.
127 tons, crossings in Final and Yuma counties, Arizona; bids Jan. 15.

Pig Iron

Pig Iron Prices, Page 227

Pittsburgh—A sale of 3000 tons of basic pig iron recently was made by a Pittsburgh producer to a Canton, O., consumer; otherwise the local iron market is dull and smaller local melters apparently cannot be persuaded to buy in advance. The market is $18.50, Neville Island, for foundry iron, $18 on basic and $19 on bessemer.

Cleveland—More melters are placing contracts covering first quarter as requirements become more definite. Some foundries on automotive work are operating day and night. Shipments to the agricultural implement manufacturers in the Indiana and Michigan districts continue at the improved rate. Corrigan, McKinney Steel Co. here last week blew in another blast furnace, now operating three of its four units.

Boston—Pig iron shipments are mostly in small lots as consumers continue to operate with meager stocks. Most buyers have covered for the quarter, but releases are expected to follow closely operations which for the most part show little improvement.

Chicago—Following a further gain in pig iron shipments here in December, an additional upturn is in prospect for January, based on probable requirements of important consumers. Operations of smaller foundries showed some hesitation at the turn of the year but this was due mainly

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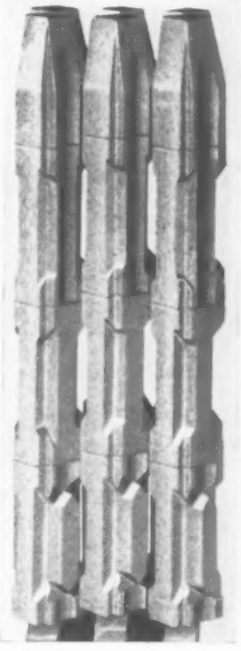

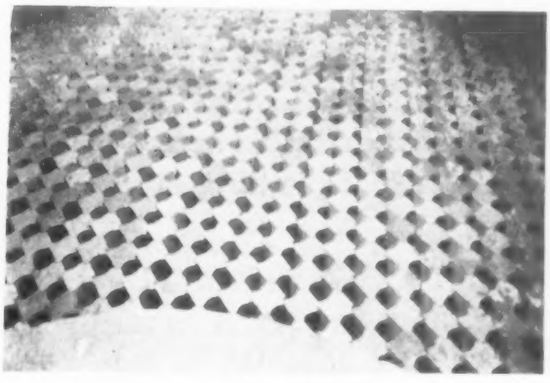

View of 60th row of Checkers as constructed in a stove.

Checkers rest on Steel Bottom manufactured of heavy standard rolled bars and sections. Each checker is inter-locked with adjoining checkers and each course inter-locked with adjacent courses, so that no brick can shift or twist and obstruct the vertical flues. All surfaces are vertical or have a 45° angle; therefore, dust can not accumulate.

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ENGINEERS
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to seasonal factors, and schedules again are increasing. Backlogs of pig iron producers are in the best volume in six months, with the majority of orders for delivery within the next 30 days. The market continues $18.50, furnace, for No. 2 foundry and malleable.

New York—With inventory season over at most consuming plants, pig iron sellers look for improved specifications this month. Releases to date have been confined to small lots for the most part. Prices are unchanged.

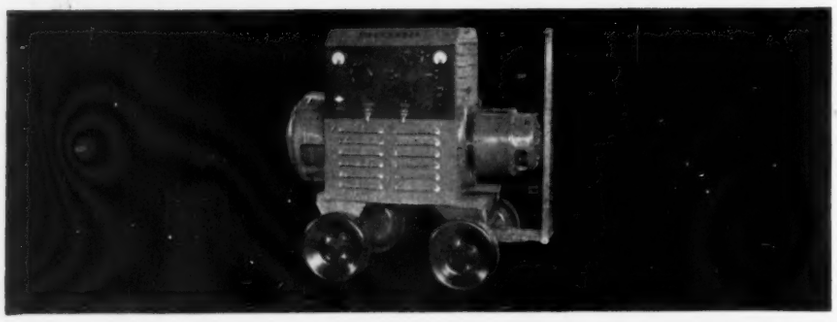
Buffalo—Good movement of pig iron began immediately after the holiday and sellers look for January to be an active month. Malleable plants are reported gaining ground after a recent slump and other foundries also have better business in sight.

Cincinnati—Closing of books for the old year disclosed that shipments during the fourth quarter were 25 per cent better than in the third quarter. Contracting for the current quarter in the past few days, however was for a tonnage equal to the fourth quarter shipments. Greater activity in the machine tool line has brought improvement in some local foundries.

Philadelphia—Pig iron shipments in December fell slightly under November, but a rebound is expected this month.

Birmingham, Ala. — Numerous small orders are in sight and the first quarter promises to be active. One blast furnace will resume operation this month.

ACCEPTED



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UNIVERSAL POWER CORPORATION
CLARKSTONE ROAD CLEVELAND, OHIO

Scrap

Scrap Prices, Page 228

Pittsburgh—Mill buying interest in scrap has not yet appeared to break a quiet market of some duration. Despite a 50-cent per ton reduction in steel specialties and a 25-cent per ton weakness in machine shop turnings and mixed borings and turnings, the undertone is strong in heavy melting steel.

Cleveland—Rising prices characterize the scrap market here with a general rise of 50 cents per ton. Sales are light but promise of greater activity is strong.

Chicago—Heavy melting steel has advanced 50 cents a ton on a sale to a local consumer at $12 and most other grades also are up 50 cents. Strength is reflected in premium prices bid on railroad lists. Cast grades, railroad steel specialties and hydraulic compressed sheets share in the rise.

Shafting and forge flashings are up 25 cents and machine turnings 50 cents. Export buying continues heavy with advances of 25 cents on some grades. Domestic demand is light.

New York—Heavy melting steel for export is stronger, $8.75 having been paid for No. 1, barge and $7.25 for No. 2. Buying is against contracts and some new foreign business has been booked.

Philadelphia — A consumer at Johnstown, Pa., has closed a fair tonnage of No. 1 heavy melting steel at $12.50, delivered. Heavy breakable cast is 50 cents higher.

Buffalo—A strong market in steel and iron scrap has been created by dealer transactions and prices considerably higher than averages for the last half of 1934 are regarded as certain. The present list is nominal but firm.

Detroit—Most scrap prices have advanced 50 cents a ton, with No. 1

heavy melting steel now quoted $9.50 to $10. Compressed sheets are up 75 cents at $10 to $10.50. Borings and turnings which recently were slightly easy have been increased 25 cents. The general market tone is stronger and further advances are expected.

Cincinnati—Iron and steel scrap is being closely held by dealers, with quotations strong. Resistance to recent price increases may serve to sway mills from tonnage contracts until the outlook is defined.

Seattle—Seasonal lethargy is apparent, although prices are holding. Little interest is expected on the part of Japanese buyers until late January. In the meantime shipments are heavy on contracts. Sellers are holding firm at going prices, hoping for an upturn, but reports from Japan state that weakness in exchange will preclude any immediate general advance.

Warehouse

Warehouse Prices, Page 226

Cleveland — Mill shipments to warehouses are improving, as stocks are being replenished after inventory. Warehouse sales, however, for the present are slow. The volume of warehouse business last year was 10 to 15 per cent over that in 1933.

Chicago—Sales recovered slightly last week, though the decline during the holiday period was smaller than usual and business continues at a better rate than a year ago.

New York—Demand for steel out of warehouse slowed during the last week due to the holiday and inventory-taking, with some rebound the latter part of the period.

Philadelphia—Outlook for demand for steel from store is brighter than a year ago and in some cases December business exceeded that of November. Prices are steady.

Cincinnati—Sales of steel from warehouses during and after the holidays were close to the level in preceding weeks.

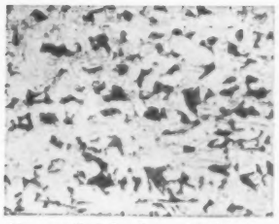
Tin Plate

Tin Plate Prices, Page 224

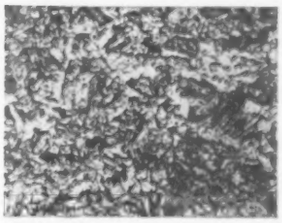
Pittsburgh — After two weeks of operations at 30 to 35 per cent, the tin plate industry this week will advance its schedules to 45 per cent. A leading American canmaker recently placed orders for 1,250,000 base boxes, or 62,500 tons, with Richard Thomas & Co. Ltd., Wales, for shipment to its Canadian plants. This same canmaker placed orders for 1,000,000 base boxes a year ago.

New York—Tin plate production for the first 11 months amounted to 1,282,000 gross tons, according to recent compilation by the American Bureau of Metal Statistics. This compares with 1,587,351 gross tons in the corresponding period of 1933 and 1,762,351 tons for all of 1933. Exports increased last year, the total for the first 11 months amounting to 158,728 tons, as compared with 95,240 tons for all of 1933. Exports in November dropped sharply to the low point of 3,859 tons, against 14,793 in October and 27,264 in March, the high point for the first 11 months.

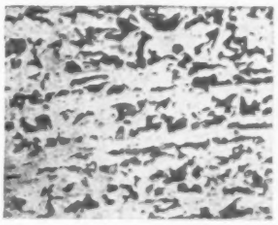
WYCKOFF *Controlled* MANGANESE STEELS



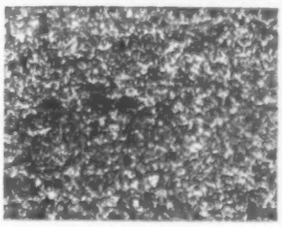
Uncontrolled Steel — magnification 67 x—etched.



Wyckoff Controlled Manganese Steel as rolled — Magnification 67 x — etched.



Uncontrolled Steel, cooled rapidly in air from 1900° F.



Wyckoff Controlled cooled rapidly in air from 1900° F.

In a recent series of tests conducted by a large eastern manufacturer, interested in obtaining a steel that would give maximum results in both uniformity and machinability, Wyckoff Controlled Manganese Steel, proved conclusively its superiority over the steels heretofore used as shown in the illustrations above.

In these tests, the superior machinability of Wyckoff Controlled Manganese Steel and its close grained structure were outstanding. After machining, it was further subjected to heating in Cyanide at 1450° F. and quenched in oil, definitely proving that its fine grain characteristics insured the MINIMUM amount of distortion.

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Turned and Polished Shafting — Turned and Ground Shafting

Semifinished

Semifinished Prices, Page 225

Resumption of several of the Pittsburgh tin plate mills on fuller schedules has accounted for renewed strength in semifinished steel shipments. A rising rate of sheet production also has aided sheet bars, but both common and forging quality billets are moving slower since Jan. 1. The market holds at $28, Pittsburgh, for sheet bars, $27 on billets, and $38 for wire rods. Alloy semifinished prices are steady, uncropped ingots being $40, and billets $49.

Cold Finished

Cold Finished Prices, Page 225

Pittsburgh—Heavier orders for cold-finished steel bars have become increasingly noticeable. Both bessemer and open-hearth carbon cold-drawn bar grades as well as alloy, are experiencing as heavy demand as at any time since last June. The 2.10c, Pittsburgh, base, applies.

Coke By-Products

Coke By-Product Prices, Page 225

New York — Consumers of sulphate of ammonia are buying conservatively at $24 per ton, Atlantic seaboard, covering for actual needs. Demand for toluol has improved. Shipments of naphthalene are expected to increase this month following light spot orders. Phenol prices are unchanged, with demand steady. Benzol has been reduced 4c, to 19.00c.

Ferroalloys

Ferroalloy Prices, Page 227

A further increase in ferromanganese specifications is likely, as steelmaking operations continue upward. This outlook also prevails in spiegeleisen. Ferromanganese prices are unchanged at $85, duty paid, Atlantic and Gulf ports, and domestic spiegeleisen, 19 to 21 per cent, $26, furnace, in lots up to 50 tons, and $24, on 50 tons and over.

Steel in Europe

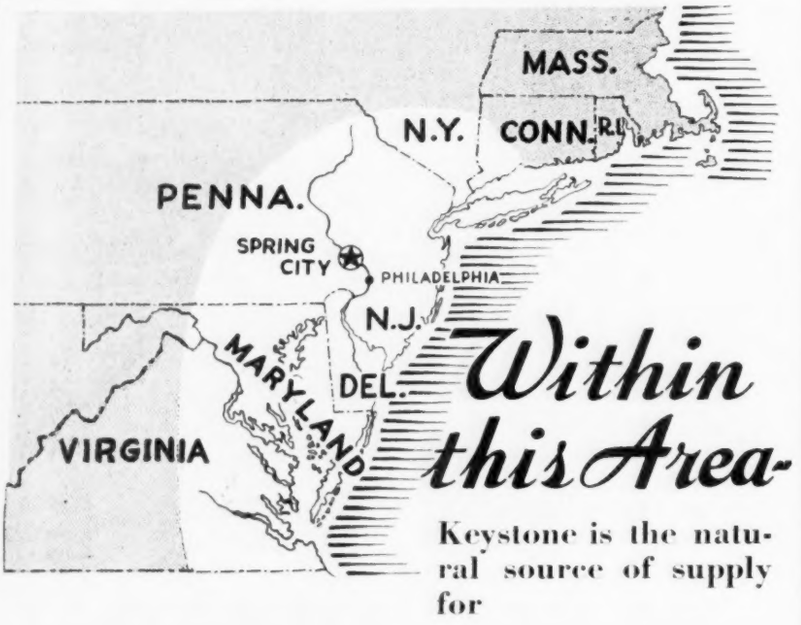
Foreign Steel Prices, Page 226

London — (*By Cable*) — British trade in steel and iron promises active business in 1935, probably requiring enlarged production. Most works are booked well into the new year. Domestic consumption of hematite is increasing and steel prospects are favorable, especially in railroad and public works requirements. Shipbuilding prospects show much improvement.

The Continent, with the exception of Germany, starts the year slowly, with uncertain prospects.

Production

STEELMAKING production increased 3½ points last week to 42½ per cent, with indications of a further rise this week. Gains were noted in the Chicago, Youngstown,



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Shafting, Turned & Ground or Turned & Polished. Rounds, squares, hexagons, flats and cold drawn shapes in all the standard and special grades.

Large Rough and Finished mill stocks for quick service.

The Quality of our Product is assured by the most modern production equipment and methods and is guaranteed by an established record for producing only the finer grades of Cold Finished Steel Bars.

KEYSTONE SERVICE permits its many customers to carry minimum stocks as they are not penalized by long or slow transportation to any point in the KEYSTONE AREA.

KEYSTONE DRAWN STEEL CO.

Spring City, Penna.

eastern Pennsylvania, Cleveland, New England and Birmingham districts, while Pittsburgh, Wheeling, Buffalo and Detroit held unchanged. Details follow:

Pittsburgh—Unchanged at 25 per cent last week, with a 2-point advance scheduled this week. Bessemer steel production is sharply advancing, with at least two plants now on full schedule. Fourteen out of 60 steelworks blast furnaces are now in blast here, a gain of two.

Buffalo—Held at 39 per cent last week, with indications this rate may be increased shortly if demand holds. Fifteen out of 38 open hearths are active.

Birmingham—Up 1 point to 27½ per cent last week, with little change indicated for this week.

Detroit—Stationary at 59 per cent last week, with 10 out of 17 open hearths on.

Youngstown—Jumped 6 points to 53 per cent last week, with 44 out of 83 open hearths active.

New England — Advanced 13 points to 68 per cent last week, owing to addition of two open hearths, and this rate is schedule to hold this week.

Central eastern seaboard — Up 4 points to 23½ per cent last week, and a further rise is in prospect.

Wheeling — Unchanged at 80 per cent last week. A 4-point rise is scheduled for this week, as three producers will have 31 out of 37 open-hearth furnaces in operation.

Cleveland-Lorain — Up 16 points to 77 per cent, open hearths operating through New Year day, and two additional units being lighted. Corrigan, McKinney Steel Co. blew in another blast furnace, operating three of its four stacks.

Chicago — Gained 5 points to 47 per cent last week, nearly all producers adding open hearths, and one lighting two more blast furnaces, giving the district 11 active blast furnaces out of 36, with one merchant stack also blowing.

Sheet Mill Wages Steady

Wage rates in sheet and tin plate mills having contracts with the Amalgamated Association of Iron, Steel and Tin Workers will be unchanged for January and February. The bimonthly settlement last week disclosed an average sales price of 2.65c per pound for Nos. 26, 27 and 28 gage black sheets in November and December, the same as in the preceding two months.

Weirton Challenges Board

Weirton Steel Co., Weirton, W. Va., on Dec. 29 filed in federal court at Wilmington a brief in the case instituted by the government in regard to the election of employe representatives on Dec. 15, 1933. The brief maintained (1) The company does not dominate its employe plan of representation, (2) employe plans have proved valuable mediums for collective bargaining, and (3) manufacturing is not interstate commmerce and hence the government has no jurisdiction.

Orders Carnegie Elections

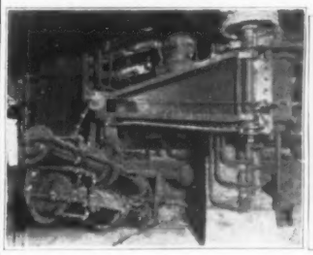
National steel labor relations board apparently wrote finis to the attempt to effect a steel labor truce when it ordered elections be held at the McDonald, O., and Duquesne, Pa., works of the Carnegie Steel Co. to select representatives for collective bargaining. This is what the Amalgamated Association of Iron, Steel and Tin Workers has been demanding.

The Carnegie company was directed to produce its payrolls for purposes of a poll list. An election usually is held a week after the payrolls have been divulged. The course confronting Carnegie now is to produce the rolls or challenge the jurisdiction of the board, which many expect.

EDGAR E.

BROSIUS

INC.



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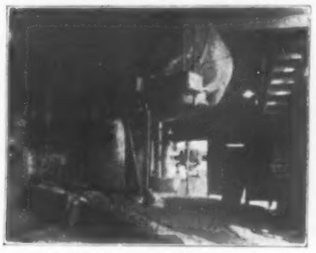
Steam, Electric, Hydro-Electric

Dry Slag Granulating Mill

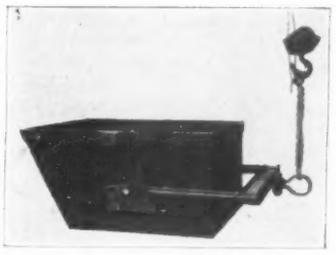
GOGGLE VALVES
Hand or Electric Operated

Flue Dust Conditioner

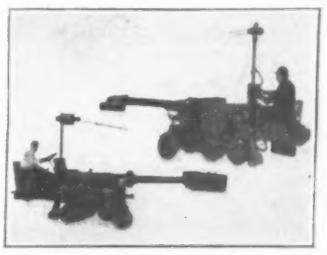


CINDER NOTCH STOPPERS
Steam & Electric Operated

BUCKETS
Single Hook & Single Hoist Automatic



Automatic Dump Bucket



AUTO FLOOR CHARGERS
Arranged for Box or Tongs

MANIPULATORS
For Hammers & Presses

Stock Line Indicators
Blast Furnace Tapping Machines
Open Hearth Tapping Machines
Hot Blast & Chimney Valves
Coke Testing Tumbling Barrels
Open Hearth Slag Granulators

PITTSBURGH

SHARPSBURG BRANCH

Personals

J. I. ANDREWS, vice president and general manager of sales for the American Sheet & Tin Plate Co., Pittsburgh, retired from active association with the company Jan. 1. He began his business career with the Illinois Steel Co. shortly before the turn of the century. Excepting for a brief period when he was affiliated with the Swift Packing Co., Louisville, Ky., he has since been continuously identified with the steel industry. In 1900 he became associated with the American Sheet Steel Co., and in 1901 with the American Sheet & Tin Plate Co. During the war he served as a member of the war industries board.

Other changes in the Sheet & Tin Plate executive personnel include the following:

F. C. Harper, formerly secretary and treasurer, has been elected vice president and general manager of sales.

Fred M. Fuller, formerly general manager of sales, has been appointed to the position of assistant to president.

Percy Cooke, formerly assistant secretary and assistant treasurer, has been elected secretary and assistant treasurer.

M. L. Gardner, formerly assistant treasurer, has been elected treasurer.

L. K. Hitchings has been elected assistant treasurer.

□ □ □

George Fonda has been appointed first assistant to John C. Williams, president of the Weirton Steel Co., Weirton, W. Va. Mr. Fonda had previously been head of the Weirton Steel Co.'s industrial relations department, and his new office is designed to bring about closer coordination between company officials and the employe representation plan.

□ □ □

O. E. Mulvane, formerly associated with the A. O. Smith Corp., Milwaukee, has been appointed enameling superintendent of the Glascote Co., Euclid, O.

□ □ □

E. A. Gump, for 17 years general purchasing agent for the Wilson Foundry & Machine Co., Pontiac, Mich., is now assistant general purchasing agent for the Willys-Overland Co., Toledo, O.

□ □ □

Griswold A. Price, since 1931 assistant sales manager at St. Louis for Carnegie Steel Co., Illinois Steel Co. and Tennessee Coal, Iron & Railroad Co., has been made manager, succeeding Stillman W. Wheelock, who has retired, as announced in STEEL for Dec. 31, page 11.

□ □ □

Harold W. Sweatt, for the past seven years vice president and general manager of the Minneapolis Honeywell Regulator Co., Minneapolis, has been elected president to succeed Mark C. Honeywell. The latter, president since 1927, has been elected chairman of the executive committee.

□ □ □

E. W. Ferry, vice president, secretary and treasurer of the Ferry Cap & Set Screw Co., Cleveland, a company founded in 1906 by his father, the late Thomas Ferry, has resigned. His plans are indefinite although he is reported to be considering organization of another screw company.

□ □ □

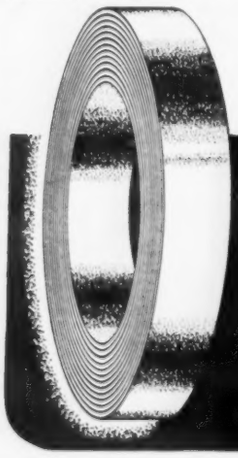
J. J. McQuillen, Pittsburgh district manager of the Morgan Engineering Co., Alliance, O., and for 45 years in the employ of this company, has been granted a leave of absence and probably will later be associated with the home office.

S. R. Cox, Jr., formerly sales engineer for the Hyatt Roller Bearing Co., and prior to that associated with the Carnegie Steel Co., succeeds Mr. McQuillen at Pittsburgh.

for your product

Protect the quality of your product—protect its life and beauty of finish by the use of Thomastrip specialized production cold rolled strip steel . . . Thomas improved methods of rolling and annealing assure precision in gauge and size dimensions, smooth bright finish, and uniformity in grain structure for deep drawing and forming operations . . . Thomas Electro Zinc Coating or Cadmium Coating, insures rust resistance produced more easily and less expensively, and an attractive durable finish which will not crack or flake in forming or drawing . . . Thomas Electro Copper Coating prolongs the life of dies, prevents material from rusting in stock, and provides the base for further plating operations . . . Investigate Thomastrip. A Thomas representative will gladly cooperate with you.

Test Thomastrip for your product. Send for test samples. Specify gauge, width, temper and coat desired.



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SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL

THOMASTRIP

STRIP COLD ROLLED STEEL

BRIGHT FINISH • ZINC COATED
COPPER COATED • CADMIUM COATED

Died:

A J. BOYLE, 47, vice president and general manager of the Lamson & Sessions Co, Chicago, western subsidiary of the Cleveland company of the same name, in Chicago, Dec. 24. He was a veteran in the bolt and nut industry, having first worked with the Pittsburgh Screw & Bolt Corp. in 1909, later removing to Gary, Ind., where he was active with the Gary Screw & Bolt Co. He helped to organize the Boss Nut Co. in 1916, and became associated with Lamson & Sessions in 1925.

□ □ □

William W. Macon, 59, for 23 years identified with the editorial department of *The Iron Age*, during 14 years of that period as managing editor and editor-in-chief, in New York, Jan. 1. Born in New York, he was graduated from Cornell university as mechanical engineer in 1898. He was associated with the editorial department of the *Engineering Record* from 1898 to 1905. From 1905 to 1911 he was editor of the *Metal Worker*, following which he began his long period of service with *The Iron Age*. Ill health forced his retirement in 1932, since when he has been consulting editor. He was a member of the American Society of Mechanical Engineers, American Iron and Steel institute, American Society of Heating and Ventilating Engineers, American Management association, and the Association des Ingenieurs de Chauffage et Ventilation de France.

W. W. Macon

□ □ □

John A. Waldburger, 77, former chief engineer of the Edgar Thomson steelworks, Carnegie Steel Co., in Braddock, Pa., Dec. 20. He was a native of Switzerland and came to the United States in 1884. He had been a resident of McKeesport, Pa., for 40 years and was a veteran Carnegie employe.

□ □ □

Alfred J. McGue, 56, for 20 years associated with the M. A. Hanna Co., Cleveland, and later moving to Richmond, Va., in the latter city, recently.

□ □ □

John N. Dickson, 77, for 54 years an employe of Carnegie Steel Co. before his retirement five years ago, and a brother of William B. Dickson, former vice president of United States Steel Corp., in Pittsburgh, Dec. 28.

□ □ □

John A. Schultz Jr., 50, president of the Schultz Die Casting Co., Toledo, O., in that city, Dec. 27. He founded the Schultz company in 1930, prior to that time having been vice president and general manager of the Doehler Die Casting Co. He was active in the die casting industry for over 30 years and in addition served a term as mayor of Ottawa Hills, Toledo suburb.

Automatic

VALVES

for the Steel Industry

4610

VALVES in use by Steel Companies alone.

GOLDEN - ANDERSON Automatic Valves are used so extensively in Steel plants because Engineers responsible for protecting huge plants from accidents and shut-downs—due to broken steam lines—cannot afford to take chances.

GOLDEN-ANDERSON VALVES are the *heaviest valves made* and are furnished in 2½" to 12" sizes.

They are fitted with "Double Corliss" dashpots, the only perfect and reliable cushioning for eliminating spinning, chattering or pounding of the valves on the varying steam conditions. Unless such automatic valves are "Double Corliss" cushioned and double extra heavy throughout to insure perfect alignment, dependable and efficient service is impossible.

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Without obligation please send a copy of your new illustrated catalog describing and illustrating GOLDEN-ANDERSON Automatic Valves.

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British Review

(*Concluded from Page* 216)

Australia before the end of 1934. These orders were doubly welcome on account of the depressed state of the British sheet trade. Toward the end of the year the trend of the tin plate trade also showed marked improvement.

Discussing the position of the industry recently, Sir William J. Larke, director of the British Iron and Steel federation, expressed the view that the improvement was likely to be maintained. He saw no reason why the British steel industry might not ultimately look for production as high as 11,000,000 tons per annum. To secure this, however, it would require more effective control of the home market than existed at present.

Imports Have Improved

During the current year, iron and steel imports had risen rapidly, having been at a rate of 1,400,000 tons per annum, whereas in 1933 they were 970,000 tons; but it was gratifying to record that the export trade showed considerable improvement, though all too slow. During recent months, iron and steel exports had been at a rate of about 25 per cent higher than the average monthly figure for 1933.

The volume of trade continues to increase, and it is safe to say that the improvement is more broadly based than it has been at any time since the recovery movement was inaugurated.

Reorganization is still one of the principal factors in the situation, and in some respects the British steel trade is still in a period of transition, but there is every reason to believe that the trade has set an example to the world in the maner in which industrial difficulties should be surmounted.

Announcement

By

Sutton Engineering Co.

We will make generous allowances on our old machines in order to safeguard the reputation and standard of *SUTTON* Equipment.

Our recent revolutionary improvements *guarantee* you end-to-end straightness on bars and tubes. Similar improvements have been made in our Leve ers and kindred equipment.

We now also manufacture latest designs of Automatic Shearing and Straightening (from coils) Machinery, Rod and Tube Polishing and Burnishing Equipment.

General arrangement drawings of our new equipment sent on request.

Sutton Engineering Co.

Park Building Pittsburgh, Pa.

Specialists in Straightening, Auxiliary and other mill equipment.

New Capacity

(*Continued from Page* 118)

patenting furnace with auxiliary equipment.

Berger Mfg. Co.: Equipment for producing voting machines.

Bethlehem Steel Co.

Completed

Cambria Plant: Cleaning house and equipment for rod and wire department, electric motor drive for 40-inch blooming mill, improvements to cooling bed of 36-inch universal plate mill.

Lackawanna Plant: Two steam boilers and two annealing furnaces at sheet mills.

Maryland Plant: Patenting and two annealing furnaces at wire mill.

Underway

Cambria Plant: Electric motor drive for rod mill at rod and wire department.

Maryland Plant: Turbo blower for blast furnaces, new blast furnace "D" replacing former "D" furnace, gas cleaning and distributing system for blast furnace gas, three gas disintegrators, moisture eliminator and mains for clean blast furnace gas; installing 8-inch bar mill including buildings and equipment; one continuous furnace and 3-high roughing mill at sheet mills.

Miscellaneous Completed

Granite City Steel Co.: One continuous gas-oil fired pair heating furnace in tin mill department. Three continuous gas-oil fired pack heating furnaces in tin mill department. One automatic feeder and catcher table in tin mill department. One automatic feeder and catcher table in sheet mill department. One wide normalizing and blue annealing furnace.

Wheeling Steel Corp: Installation at Yorkville, O., division of a 5-stand continuous cold strip mill for production of plates for tinning. Capacity about 7500 tons per month. Six double box annealing furnaces, one continuous pickler, and one tin mill pickler for use in connection with new mill.

Central Iron & Steel Co.: Gas producers equipped with combustion control and turbo-blowers. Roof temperature control and automatic reversal control installed on one open hearth. Contemplate the insulation of open-hearth and mill heating furnaces and

installation of roof temperature controls on balance of steelmaking furnaces. A new engine now on hand for the 126-inch plate mill will be installed.

John A. Roebling's Sons Co.: Installed two bell-type annealing furnaces at Trenton and Roebling, N. J., divisions. Two additional units of this type being installed at Trenton division.

Empire Sheet & Tin Plate Co.: Dismantled Thomas plant, a 12-unit sheet mill, and the Waddell plant, an 8-unit sheet mill, both at Niles, O.

Bopp Steel Corp.: Installed electric annealing furnace.

Michigan Seamless Tube Co.: New buildings and annealing furnace.

Laclede Steel Co.: Installed new engine frames for 32-inch blooming mill. Twelve soaking pits enlarged and rebuilt. Continuous wire drawing machine. Superheaters added to two boilers. All at Alton, Ill., division.

United States Steel & Wire Co.: Galvanizing and tinning units. Plans to install electric plating plant.

West Leechburg Steel Co.: Copper plating plant.

Inland Steel Co.: Tunnel kiln for annealing sheets; capacity 5000 tons a month.

Page Steel & Wire Co.: Electrified all rod mill drives at Monessen, Pa., division.

Transportation

(*Concluded from Page* 121)

comotive and cars was a noticeable sidesway at speeds upward of 70 miles per hour.

One redesign method may be the replacement of many of the existing 50,000-odd locomotives with small steam locomotives of the old, conventional, and still most popular 4-4-4 type. This design can handle adequately light-weight trains on present operating schedules. Both the Baltimore & Ohio and New York Central have streamlined a test locomotive.

"As far as efficiency is concerned, such a locomotive would compare with the best line locomotives of today; it would operate at high pressure with high temperature steam; its parts would be light; its maintenance would be low and it would work with existing passenger cars," states William C. Dickerman, president of American Locomotive Co., New York. This locomotive would be especially adaptable to shorter trains, more frequently operated.

Obviously, the railroads will not prosper with over 25,000 of the 50,000-odd locomotives of today obsolete and less than 10,000 of the 50,000 having a "modern" rating. A widespread replacement of locomotives is needed as one way out for the railroads to genuinely control operating expenses and to increase net operating income.

THE American railroad passenger car is the heaviest in the world. With the railroads' recent efforts to get light-weight passenger cars for use with streamlined trains there are now probably two motivating reasons.

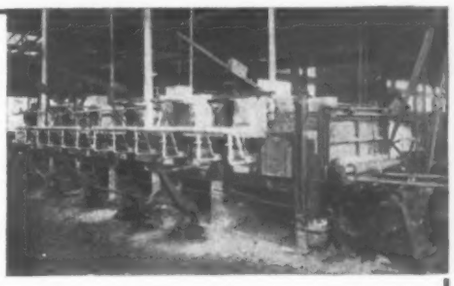
One, undoubtedly, is the weather eye the carriers have cocked on this as one possibility to regain lost passenger traffic. The other is the weight-saving problem, but only to a degree.

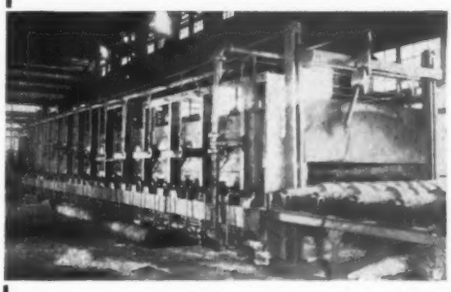
As yet it is premature to make adequate allowance for the novelty feature to the recent streamlined trains. Seven railroads by now have hoisted a trial balloon on this new type passenger car. Counting all cars built and on order, only 71 passenger cars are accounted for out of a total of some 46,000. Of the 71, the race so far is fairly even between use of high-tensile steel and aluminum, with stainless steel running third.

Passenger car construction methods on these few cars have undergone a radical change. Regardless of which of the three materials is used, a considerable reduction in total weight is inevitable, in some cases up to 75 per cent, considering the same baggage and passenger capacity. Consequently, impact value claims on the various types of new steels, as well as aluminum, are being closely surveyed.

INDUSTRIAL FURNACES

BURNER EQUIPMENT





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PENNSYLVANIA INDUSTRIAL ENGINEERS
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50 PENN AVENUE PITTSBURGH, PA.

1934 Iron Output Up 20.8 Per Cent

CONTINUING on the recovery swing started in October, United States production of coke pig iron made another substantial gain in December and carried the country's total for the year to 15,977,413 gross tons, a figure which was 20.8 per cent better than in 1933 and the highest recorded since 1931. A net increase of 7 active blast furnaces, raising the total to 67, was responsible for the favorable showing of December, for operating stacks had dropped from 65 in October to 60 at the close of November.

The year's production of iron was an increase of 2,755,706 tons over the 1933 output of 13,221,707 tons, but fell short of the 1931 total by 2,285,598 tons. Iron made in 1932 amounted to only 8,674,067 tons.

Pig iron produced in December totaled 1,027,740 tons, an increase of 69,834 tons, or 7.3 per cent, over the November output of 957,906 tons. Part of this gain is accounted for by the fact that December was a one-day longer month than November. The December figure was the best since August with 1,060,187 tons, but was considerably smaller than the 1,192,136 tons made in December, 1933.

Average daily production in December was 33,153 tons, which, compared with the 31,930 tons of November, was an improvement of 1223 tons, or 3.8 per cent. It was the highest daily rate since August with 34,199 tons. The rate in December, one year ago, was 38,456 tons per day.

Relating production to capacity, the operating rate for December was 23.7 per cent, as compared with 22.8 per cent in November, 22.1 per cent in October and 21.5 per cent in September. The December rate was the highest since August with 24.5 per cent. The highest rate for the year was 47.5 per cent in May. In December, one year ago, the rate was 27.9 per cent.

The total of 67 operating blast furnaces on Dec. 31 was the highest since July with 74 producing iron on the last day of the month. Active stacks totaled 60 on Nov. 30, 65 on Oct. 31, 61 on Sept. 30 and 61 on Aug. 31. The best figure for the year was 117 on May 31. At the close of 1933, 74 furnaces were in production.

During December, 12 stacks re-

MONTHLY IRON PRODUCTION

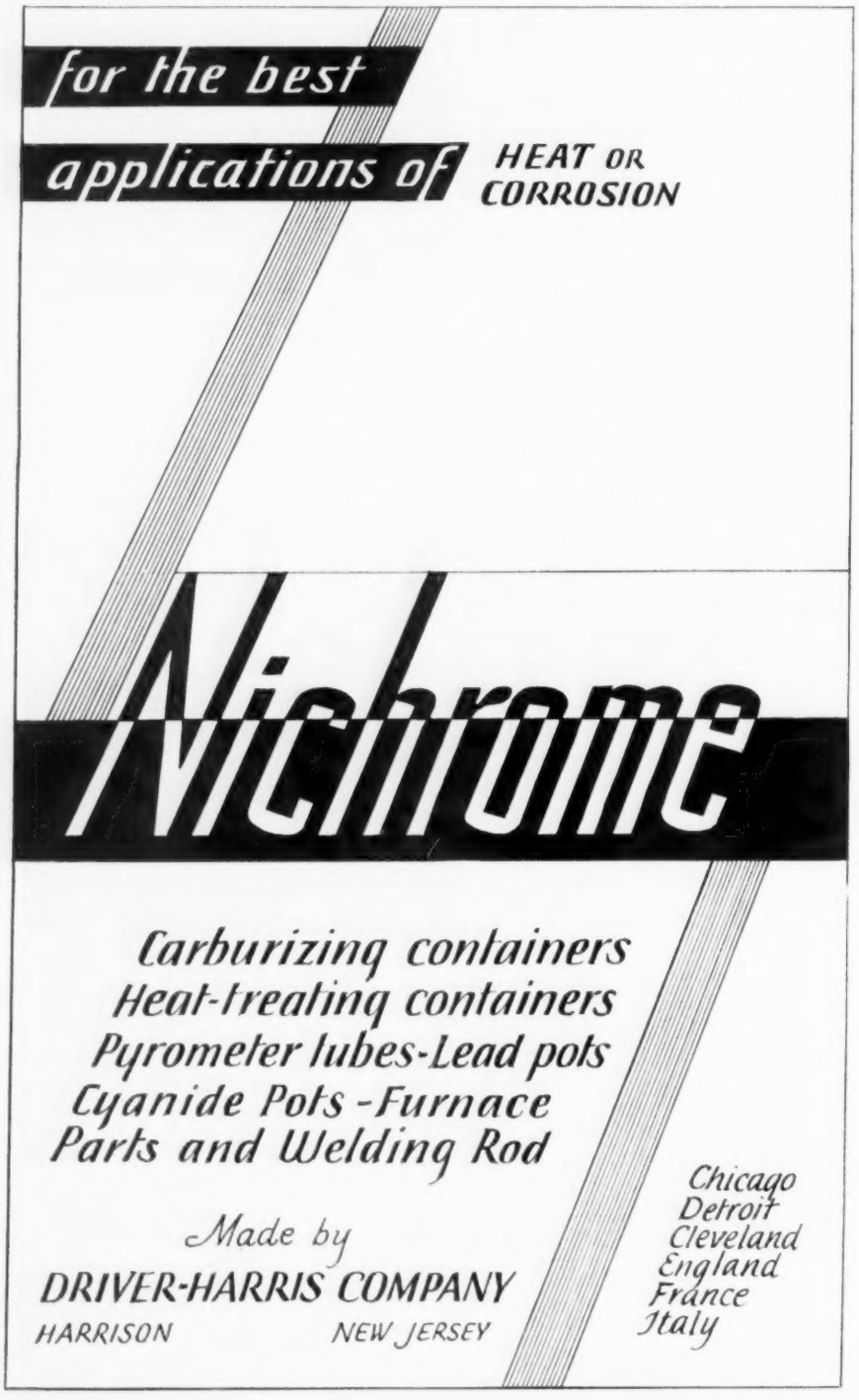
	1934	1933	1932
Jan.	1,225,643	568,785	971,437
Feb.	1,270,792	553,067	960,550
Mar.	1,625,588	542,013	967,915
Apr.	1,736,217	623,606	855,734
May	2,057,471	892,326	783,769
June	1,936,897	1,264,953	626,015
July	1,228,544	1,801,345	570,222
Aug.	1,060,187	1,833,265	528,105
Sept.	899,075	1,507,931	593,640
Oct.	951,353	1,358,540	644,648
Nov.	957,906	1,083,740	625,753
Dec.	1,027,740	1,192,136	547,179
Total	15,977,413	13,221,707	8,674,067

RATE OF OPERATION

(Relation of Production to Capacity)

	1934[1]	1933[2]	1932[3]	1931[4]
Jan.	28.3	13.3	22.1	38.4
Feb.	32.5	14.3	23.4	42.5
Mar.	37.5	12.7	22.0	45.4
Apr.	41.4	15.1	20.2	46.5
May	47.5	20.9	17.9	44.7
June	46.3	30.6	14.7	37.9
July	28.4	42.4	13.0	32.7
Aug.	24.5	42.8	12.0	28.7
Sept.	21.5	36.4	14.0	27.0
Oct.	22.1	31.8	14.7	26.3
Nov.	22.8	26.2	14.7	25.5
Dec.	23.7	27.9	12.5	22.0

[1]Based on capacity of 50,975,561 gross tons, Dec. 31, 1933; [2]on capacity of 50,313,975 tons, Dec. 31, 1932; [3]on capacity of 51,598,175 tons; [4]on capacity of 52,515,875 tons. Capacities by American Iron and Steel institute.



sumed operations and 5 were blown out or banked, the net increase being 7. Of the nonmerchant or steelworks class, 11 were blown in and 2 were taken out, with a net gain of 9. Of the merchant class, 1 furnace resumed and 3 were blown out, with a net loss of 2 units.

Furnaces resuming during December were: In Ohio: Ohio C, Youngstown Sheet & Tube Co.; Ohio No. 2, Carnegie Steel Co.; Toledo B, Interlake Iron Corp.; Lorain No. 1, National Tube Co.; one Haselton, Republic Steel Corp. In Pennsylvania: Monongahela No. 1, National Tube Co.; one Aliquippa, Jones & Laughlin Steel Corp. In New York: Buffalo No. 1, Republic Steel Corp. In Maryland: Maryland A, Bethlehem Steel Co. In West Virginia: One Weirton, National Steel Corp. In Illinois: South Works New No. 10, Illinois Steel Co. In Alabama: Ensley No. 5, Tennessee Coal, Iron & Railroad Co.

Stacks blown out or banked during the month were: In Ohio: One Buckeye, American Rolling Mill Co. In Pennsylvania: Palmerton No. 1, New Jersey Zinc Co.; Neville Island, Davison Coke & Iron Co.; Steelton B, Bethlehem Steel Co. In New York: Standish, Chateaugay Coal & Iron Co.

Complete statistics on pig iron production and operating furnaces by months from 1915 to Nov. 1934 and by years from 1885 to 1914 will be found on page 210 of this issue of STEEL.

AVERAGE DAILY PRODUCTION

	1934	1933	1932	1931
Jan.	39,537	18,348	31,336	55,337
Feb.	45,385	19,752	33,122	61,114
Mar.	52,438	17,484	31,194	65,448
Apr.	57,873	20,786	28,524	66,986
May	66,370	28,784	25,282	64,355
June	64,563	42,165	20,867	54,599
July	39,630	58,108	18,394	47,170
Aug.	34,199	59,137	17,035	41,264
Sept.	29,969	50,264	19,788	38,947
Oct.	30,689	43,824	20,795	37,831
Nov.	31,930	36,124	20,858	36,727
Dec.	33,153	38,456	17,650	31,625
Av.	43,774	36,223	23,699	50,035

DECEMBER IRON PRODUCTION

	No. in blast last day of Dec.	No. in blast last day of Nov.	Total tonnage Merchant	Total tonnage Nonmerchant
Ohio	19	15	45,379	255,628
Penna.	17	18	4,558*	234,800*
Alabama	6	5	35,539	30,840
Illinois	5	4	24,385	75,655
New York	4	4	25,615	36,174
Colorado	1	1	449	155,618
Indiana	5	5		
Maryland	3	2		
Virginia	0	0		
Kentucky	1	1	354	102,746
Mass.	0	0		
Tennessee	0	0		
Utah	1	1		
West Va.	2	1		
Michigan	3	3		
Minnesota	0	0		
Missouri	0	0		
Total	67	60	136,279*	891,461*

*Includes ferro and spiegeleisen.

Nonferrous Metals

Nonferrous Metal Prices, Page 227, 228

New York—Nonferrous metal markets were quiet with prices generally unchanged last week. Final reports which are being received for 1934 reveal improved conditions and sentiment is optimistic in regard to prospects for the new year.

Copper—Sales for December showed an increase of more than 4000 tons over the total for November. Prices held on the basis of 9.00c, Connecticut, for electrolytic.

Lead—Prices were unchanged on the basis of 3.55c, East St. Louis. Market was moderately active with fair-sized volume of inquiry noted for February delivery.

Zinc—Sales were larger than usual for this time of the year. Prime western held at 3.72½c, East St. Louis.

Tin—Straits metal continued to show a weakening tendency after rising 5 points to 50.75c Monday. Later in the week sales were made around 50.67½c. The trade considered December's decline in the world's visible supply to the lowest point since 1926 as favorable.

THE S F Co.

THE SHENANGO FURNACE CO.

Lake Superior Iron Ores

Bessemer Non Bessemer
Aluminiferous

Shenango Pig Iron

Bessemer Basic
Malleable Foundry

SHENANGO-PENN MOLD CO.

Ingot Molds
Centrifugally Cast
Bronze Bushings

W. P. SNYDER & COMPANY

Established 1888

Iron Ore Pig Iron
Coal Coke

OLIVER BUILDING·PITTSBURGH

Genealogy

(Concluded from Page 122)

one time was president of the Eagle works. A. M. Byers, whose name is perpetuated in the wrought iron plant at Ambridge, Pa., was president of the old Atlantic works at New Castle. Fayette Brown, of Cleveland, was among the receivers for Brown, Bonnell & Co. in 1894. And this only scratches the surface.

The gay 90's were not so gay for the iron and steel industry. The panic of 1893 left scars that never healed. In the twilight of the 90's came many consolidations of plants making similar products.

These consolidations were called trusts—a name that had not yet become opprobrious. At this time were organized the National Steel Co., the American Sheet Steel Co., American Tin Plate Co., Federal Steel Co., American Steel Hoop Co.—all to become part of the United States Steel Corp. on its formation in 1901, and others. These mergers took in practically all of the steel companies, leaving outside the pale many wrought iron manufacturers.

Seeing his opportunity, Harry Rubens, an eastern attorney, collected these and formed the trust called the Republic Iron & Steel Co., the capitalization being $30,000,000 in common and $25,000,000 in preferred stock, these amounts being slightly reduced later.

Men fraught with importance not only in steel but also in finance sat around the directors' table at the first meeting. They included August Belmont, Myron C. Wick, G. B. Schley, Randolph S. Warner, George R. Sheldon, J. G. Caldwell, G. Watson French, Alexis W. Thompson, George D. Wick, John F. Taylor, Mr. Rubens, T. A. Meysenburg, L. E. Cochran, James C. Corns, W. H. Hassinger, P. L. Kimberly, George M. Bard, George M. Clark, Samuel Thomas and Mr. Llewellyn.

And other stars also were in the ascendency in the old Republic. Several years later, L. C. Hanna became a director. So did John Crerar, whose library stands on North Michigan avenue, Chicago. Then came Harry L. Rownd, now in retirement. No less a figure than John W. Gates, of "bet you a million" fame, barged on the scene.

John A. Topping, who only died in the past year, did not become president until 1906, when the Gates group obtained control. In the same year Severn P. Ker, long identified with the Sharon Steel Hoop Co., became a vice president, along with Thomas J. Bray. E. W. Oglebay, Charles Hart and James A. Campbell also flitted in and out of the Republic picture in its early period.

A grab-basket of bar iron plants at the time when steel was definitely in the ascendency, Republic immediately started to modernize, and in 1900 its first bessemer plant at Youngstown, with a daily capacity of 600 tons, was completed. One by one the old bar iron plants were jettisoned or rebuilt for steel, and there were fewer branches on the Republic family tree. Meanwhile, many iron ore properties were acquired, but not until 1919, when the Deforett Sheet & Tin Plate Co. at Niles was absorbed did the tree start to grow again. The culmination, of course, was the formation of the present Republic Steel Corp., headed by Tom M. Girdler, at the close of 1929.

Other components of Republic also have had interesting careers. Strangely enough, the group comprising Joseph Corrigan, Price McKinney, Stevenson Burke and J. E. Ferris at one time were identified with what is now the Bourne-Fuller Co. Later they organized the Corrigan, McKinney Steel Co.

Donner Steel Co., Central Alloy Steel Corp., Truscon Steel Co., Interstate Iron & Steel Co., Union Drawn Steel Co. and other companies included in Republic or scheduled to be put into it have had long, honorable histories.

THE PARKERSBURG IRON and STEEL CO.

◆

Manufacturers of

SHEET STEEL ROOFING PRODUCTS

BLACK and GALVANIZED SHEETS

STOVE PIPE, STOVE PIPE ELBOWS, DRIPPING PANS

WALNUT GRAINED and GALVANIZED UNLINED STOVE BOARDS

VITREOUS ENAMELED STOVE PIPE and ELBOWS

◆

PARKERSBURG, W. Va.

Branch Offices:

PITTSBURGH, PA. SAN FRANCISCO, CAL. MEMPHIS, TENN.
CHARLOTTE, N. C. ROANOKE, VA.

Surface Treatment Makes Advances

(*Concluded from Page* 149)

solutions removes oil and grease spots and glove marks from sheets, strip and tin plate and results in a much better product for galvanizing.

Development of inhibitors has reached a stage where acid now is inhibited in the tank car in the acid plant, or at the steel plant, and thus is completely inhibited when placed in the storage tank in the steel mill. A valuable innovation is the use of water with pressures up to 400 pounds per square inch for rinsing wire, cold drawn steel, etc., instead of immersing in cold water. A new development watched with interest is the internal heating of the pickling bath with immersion heaters, which also have been applied to the cleaning solutions.

The art of pickling is being placed upon a modern scientific basis, says Mr. Imhoff. Bath temperatures are being definitely standardized and controlled by automatic instruments; acid strength is determined accurately with the aid of quick test pickle tablets and capsules and by titration.

The galvanizing industry is becoming more and more alert to the fact that the grade known as prime Western zinc is not of sufficiently high quality, says Mr. Imhoff. The wire industry has used a better grade for some time and now many of the ordinary galvanizing plants are finding that a considerable saving of by-products is brought about by using a better quality of zinc.

An important contribution to galvanizing engineering during 1934 is a new combustion device for coke fired galvanizing furnaces, says Mr. Imhoff, in relation to an improvement developed by him recently. This is intended to affect uniform distribution of heat and economy in fuel.

Pickling Tanks of Douglas Fir

F. H. Bailey, Hauser-Stander Tank Co., Cincinnati, comments on the tendency during 1934 to substitute an especially selected grade of Douglas fir timber for the 90 per cent heart grade of long leaf yellow pine in common use for many years in the manufacture of pickling tanks. This substitution results from the restricted supply of this grade of yellow pine.

Improvements in wire galvanizing included the development of a coating regulator for use in connection with hot dip furnaces. This is said to produce a uniformly galvanized wire with a coating of minimum porosity. Experiments with electrogalvanizing of flat materials, already entirely successful with wire, proceeded during the year. One of the interesting developments in galvanizing during the year was the fact that for the first time galvanized hull plates and angles were used on government vessels.

Pickling tanks without seams or joints, molded from synthetic resin material, were developed during the year. The tumbling method of descaling forgings in a weak acid solution with stainless steel stars gained in use.

Better methods of control, improved coating materials and improved equipment were noted in the porcelain enameling industry. Of great importance to this industry was the development of improved methods of attaching porcelain enameled sheets to building exteriors.

Several producers of tin plate have been experimenting with a light-gage plate with a coating containing an extremely small percentage of lead, this material being for the use of oil companies in making quart oil containers.

Bright annealing gained in use during the year and there were numerous installations of controlled atmosphere furnaces in both producing and consuming plants.

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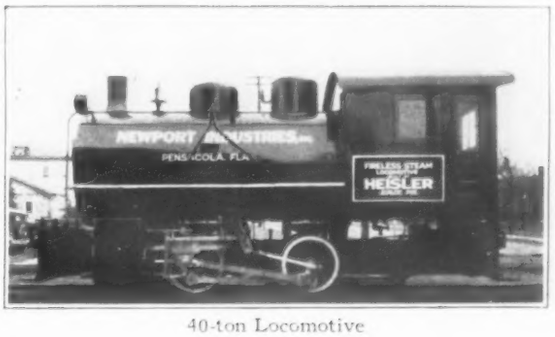
Wages of one operator, an occasional charge of steam from a stationary boiler, and a little oil and grease constitute the total cost of operation.



40-ton Locomotive

80% of the maintenance expense of a fired locomotive is caused by the boiler, fire-box, staybolts, flues, grate bars, injectors and water tank. All of these items are absent on the Fireless.

A Heisler Fireless Locomotive, in ordinary switching service, will operate from three to six hours on one charge.

Many steel mills are now turning to the Fireless as a means of reducing production costs.

Write for descriptive literature.

Heisler Locomotive Works

322 West 16th St.
ERIE, PA.

Progress Made In Various Lines

(*Concluded from Page* 149)

specification covering the grades of silver solder required for various applications. 11/12, pp. 29-60.

Powder metallurgy—what recent developments mean in terms of applications in the field of ferrous materials. 11/19, p. 52.

How abrasive dust is kept from entering oil reservoirs of bearings by using a wick oil bearing, since the particles do not follow the wick to the bearing surface. 5/7, p. 39.

Using jigs and clamps assists in welding sheets; water cooled jigs carry away heat and prevent distortion of metal.

Using glycerin as flux conditioner in hot galvanizing—an article giving practical information to the galvanizer. 5/21, pp. 23-25.

Classifying tool steels by new P-F characteristic; P and F, respectively, denote penetration and fracture values. 5/14, p. 43.

Increasing die storage capacity—steel racks built at casket manufacturing plant for die storage; quadruple storage capacity by placing dies 4-high. 1/22, p. 33.

Rubber cushions machinery against vibrations; a 5000-pound blower, cushioned by eight ½-inch rubber strips, operates with barely a sound. 4/23, p. 30.

Properties of cromansil steels for structural purposes. 5/21 pp. 32-50.

Vinegar cleans galvanized sheets — a method of preparing galvanized sheets to take a coat of paint. 10/15, p. 32.

Welding saves 20 per cent in weight of vessel, 179 feet long, for Great Lakes service. 4/16, p. 40.

Using cylinder gas for air tools; compressed air or nitrogen in cylinders is being used for riveting or drilling where the job is too small to warrant setting up an air compressor installation. 10/15, p. 33.

Acid-proof rubber covering applied to large exhaust fan units, by a new process of placing rubber on metal. 11/5, p. 40.

Annealing time reduced to 72 hours in electric malleablizing furnace. 6/4, p. 44.

Green paint claimed to be least expensive finishing coat; only one coat of green is needed as a rule to hide completely the steel beneath. 8/20, p. 25.

How fabricators are affected by revisions in boiler codes — an article of special interest to manufacturers of pressure vessels. 7/2, pp. 23-25; 7/23, pp. 32-36.

Calculating correct oil pressures — a formula relating the lubricating oil pressure to the total weight of the work piece and the work table. 8/20, p. 30.

Design of large bending roll yoke predetermined photoelastically; a study of celluloid models in polarized light showed stress lines. 8/20, p. 39.

Solder fittings find wider use; a manufacturer of air cooled air compressors now utilizes a cooling pipe coil made of copper tubing with solder joints. 8/27, p. 29.

Timing control for use in spot welding; applicable on all spot welding applications excepting those requiring very short timing — less than 5 cycles. 5/28, p. 52.

Heated bearings lubricated by colloidal graphite; a method employed on bearings on high intensity carbon searchlights. 9/24, p. 59.

Bronze welding cast iron enabled a stove manufacturer to get an order because by this method he was able to attach a bracket to the stove. 5/7, p. 36.

New method of galvanizing affords uniform coating — a method of producing superior finish on wire. 8/27, pp. 40-41.

Stainless steel extends life of soap boiling vats; a thin strip of stainless steel wide enough to cover the oxide zone accomplishes this result. 8/20, p. 34.

Thawing frozen pipes by arc welding generators. 12/10, p. 38.

Special alloy steel bolts resist shearing stress; these bolts contain 1.25 per cent molybdenum and 0.4 per cent vanadium. 11/5, p. 42.

Boron carbide — new wear-resisting abrasive product. 10/1, p. 43.

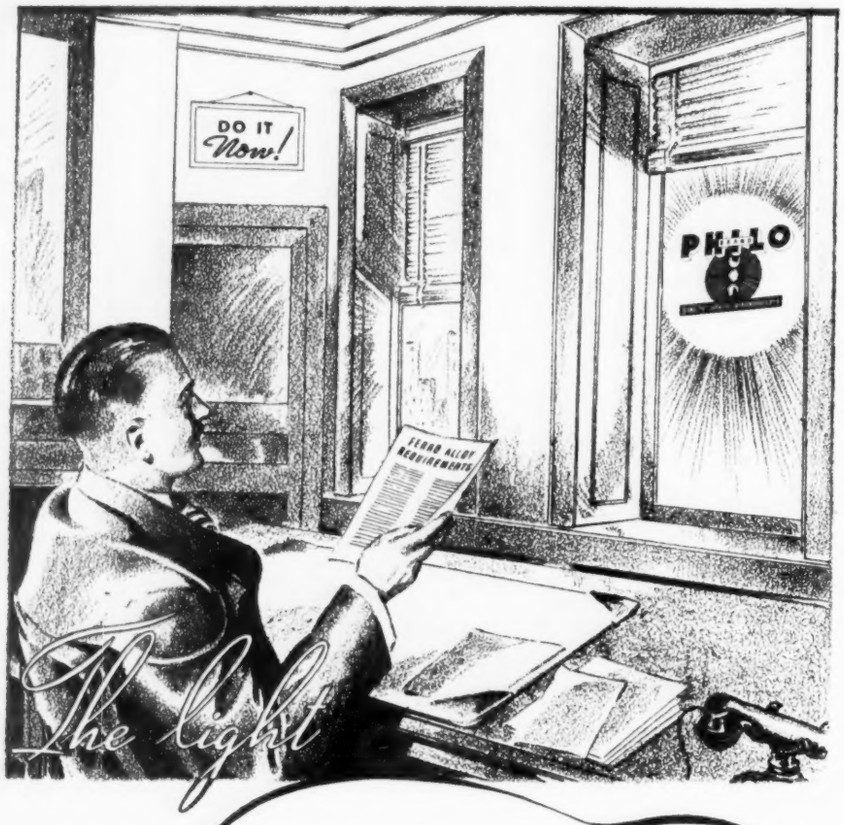
Metal surfaces to be metal sprayed may be roughened by blasting with steel grit or by rough turning in lathe. 3/5, p. 32.

Crane brake drums wear longer when 0.50 per cent molybdenum is added to the gray iron mixture. 3/12, p. 40.

Dense, solid steel castings produced at one foundry by centrifugally rotating the molds. 2/26, p. 26.

Chromium plated dies have a low coefficient of friction and are used with success in drawing mild carbon steel. 2/26, p. 26.

Making the Ford cast alloy crankshafts; an article describing the Ford Motor Co.'s methods of making crankshafts cast from a chromium cast iron containing over 2.50 per cent copper. 3/19, pp. 25-53.



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Canton, Ohio

Grain Size Effect Better Understood

(*Continued from Page* 150)

ment would eliminate or greatly reduce them.

Renewed interest in grain size of steel and its effect upon heat treatment, appeals to H. M. Boylston, professor of metallurgy, Case School of Applied Science, Cleveland, as outstanding during the year. He also points to the trend in designing furnaces to meet needs of individual customers, and fitting these units into the line of production. Specific requirements which heat treating plants are imposing in connection with furnace equipment are pleasing general appearance, cleanliness, automatic or semiautomatic operation, close temperature regulation, and atmosphere control. Prof. Boylston believes a problem requiring greater attention is retention of good surfaces and prevention of skin decarburization on heat treated work.

Industry has been going along as best it could under adverse conditions, but it has been gratifying to note that industrial research has weathered the test well. This is the observation of R. L. Dowdell, professor of metallography, University of Minnesota, Minneapolis. Furnace operations using controlled atmospheres now are becoming more general and probably there will be a still greater stride along this line when conditions permit. Activity in nitriding seems to be slowing up, at least, from the standpoint of published research. Considerable activity is found in research on effect of grain size and impurities in metals.

Controlled Atmosphere Treating

Continued growth in the use of furnaces with controlled atmospheres is regarded as an outstanding development of the year by J. M. Watson, metallurgical engineer, Hupp Motor Car Corp., Detroit. This method of treatment gives excellent results and it is expected that the future will see a large percentage of heat treating work done in this type of equipment.

Unfortunately for the heat treating department, states Mr. Watson, the tendency seems to be to diversify the types of steel used in automobile construction, especially now that the Society of Automotive Engineers is undertaking a revision of its steel specifications. This is going to make it more complicated to route work through heat treating plants and will mean that metallurgical departments will have to pay much closer attention to heat treating specifications and methods than they have previously.

Reference to the work of the S.A.E. in revising and bringing up to date its carburizing and heat treating practices also is made by E. F. Davis, metallurgist, Warner Gear Co., Muncie, Ind., who is taking an active part in this program. He points out that a number of new steels will be added to the present list of S.A.E. specifications.

Commenting on progress in heat treating and metallurgy during 1935, Mr. Davis regards as the principal advance the wider employment of fine-grained steels for gears, springs and shafting. The abnormal steels are finding useful application in constructional parts. The carbon-molybdenum steels have proved successful for coil springs used in knee-action mechanisms. Considerable discussion is going on among metallurgists regarding elimination of the term "abnormal" due to its inference that such steels are actually defective, whereas many abnormal steels are superior in certain applications. It is possible that type symbols may be used in the future to indicate abnormality characteristics.

A qualified observer in the farm implement field considers as important the process of non-martensitic hardening of steel by quenching into a medium which is held at a temperature between 500 and 700 degrees Fahr. for decomposition of austenite into remarkably tough or ductile components, in a narrow but high range of hardness, for example, Rockwell C 40-55.

OHIO

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HAVE BEEN MARKEDLY IMPROVED DURING THESE LAST FOUR YEARS AND THE IMPROVED FEATURES HAVE HAD PLENTY OF TIME TO DEMONSTRATE THEIR VALUE IN ONE TO THREE YEARS OF HARD MILL SERVICE.

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Ohio Magnet Controllers now have Lavite, *unburnable*, arc shields; and thyrite arc suppressors, *built in*, to quickly absorb the kick voltage, prevent big arc at control contacts, protect the line and insure quick drop.

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Explanation of this process was made available during the year by E. C. Bain and E. S. Davenport, research laboratories, United States Steel Corp., Kearny, N. J.

In this metallurgist's opinion, the greatest single problem yet unsolved, and not definitely provided for in heat treatment, is that of measuring and producing the optimum grain refinement in individual pieces in continuous hardening processes.

H. A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, is of the impression that the fuel-fired furnace is recovering much of the ground which it at one time lost to the electric furnace. Presumably the reason is the high cost of electric energy and the efforts made by those interested in gas-fired units in developing temperature and atmosphere control.

An outstanding development in heat treatment last year, according to Howard Scott, section engineer, special problems section, metallurgical division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., was the application of controlled atmospheres to furnaces for hardening tool steels requiring high-temperature quenching, such as high-speed and hot-working steels. This constitutes a belated recognition of a major problem in the field.

Extension of the application of protective atmospheres to electric heat treating furnaces in which steel parts are heated and subsequently quenched, is commented upon by C. L. Ipsen, industrial heating section, General Electric Co., Schenectady, N. Y. Products from these furnaces have remarkably uniform hardness and surfaces free from scale and decarburization. Controlled atmosphere furnaces for bright annealing of ferrous and nonferrous products continue to meet with good demand.

Work of the General Electric Co. on metallurgical problems brought forth an outstanding development—heat-treated, electric furnace, high-strength, ductile iron, or heat-treated cast iron. The iron is actually an electrically melted heat-treated cast iron synthesized from steel scrap and coke. By this process, it is possible to convert scrap silicon steel punchings and scrap low-carbon steel plate into usable castings.

Control of temperature is considered in some detail by A. M. Steever, vice president and technical director, Lindberg Steel Treating Co., Chicago, who declares that accuracy of automatic control has been improved by eliminating thermocouple lag.

A combination of "on and off" control and adjustment of rate of heating in accordance with the temperature and type of load has eliminated thermocouple lag and assured control at the desired point. This new method of control, applicable to gas, oil, or electric furnaces, reduces the heating rate by the "on and off" principle. The burners or elements operate a percentage of each minute in accordance with the setting of the instrument. In fuel-fired furnaces, the fuel-air ratio is set at the most efficient point and remains at that point regardless of the heating rate.

Case Hardening with Nitrogen

In connection with the subject of surface hardening of steel, V. T. Malcolm, director of research, Chapman Valve Mfg. Co., Indian Orchard, Mass., mentions the progress of the process developed by his company several years ago and more recently receiving wider recognition as a production method. The process produces an extremely hard case of required depth in a short time by exposing the steel to activated nitrogen. An important advantage of the process is that it is applicable to ordinary, low-cost steels.

Announced in 1934 by the E. F. Houghton & Co., Philadelphia, was a new liquid carburizing medium. The carburizer consists of two materials—liquid heat and carbon—placed in any salt bath furnace capable of sustaining heat a 1500 to 1650 degrees Fahr. A comparatively short time is required to produce an exceedingly hard deep case. The bath is free from objectionable fumes and work comes out of it clean.

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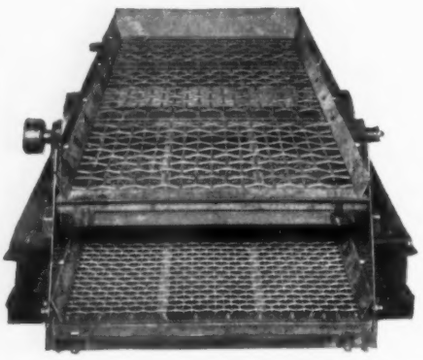

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Requirements for Forgings Exacting

(*Concluded from Page* 152)

stiffening up and elimination of multiplicity of parts by casting a more intricate frame which integrates parts previously attached by bolting or other means. Another development is the use of air-operated friction-type clutches, which in conjunction with air brakes, have smoothed out machine operation.

Closer tolerances in the accuracy of forgings is requiring accurate die work, more careful heating of stock and greater uniformity in forging operations. Rigid metallurgical inspection also is required as regards grain flow, structure and the like. These are among observations made by D. R. Davies, president, Acme Machinery Co., Cleveland. Considerable work has been done in forging stainless steels, which, in the case of 18-8, requires several times as much pressure as ordinary steels.

Builders of hammers and forging machines have redesigned their equipment, says Mr. Davies, to increase power and range and to provide more sensitive and accurate controls. In forging machines, some of the new design features are larger die spaces, long slides for accurate tool alignment, new crankshaft design to eliminate deflection and breakage, cushioned or friction drives, and heavier beds. Forging furnaces for both gas and oil show improvements in fuel economy, life of linings, accuracy of temperature control and in reducing scaling through use of controlled atmospheres.

Automatic Equipment Gains

Real progress is being made in the technical end of the forging business, states the National Machinery Co., Tiffin, O., with improved equipment playing an important part. For example, a forging machine built by this company is equipped with an automatic tong feed device which handles the blanks through the machine, this device not only reducing labor cost but improving quality of the product as well. It appears certain that the use of automatic feed mechanisms on forging equipment will increase in the future. A new type of air clutch in combination with a friction relief has also been introduced on the company's forging machines.

A large manufacturer of forging equipment comments that the individually motor driven board drop hammer seems to have taken over that field definitely, with practically all manufacturers represented with such a line. During 1934, there was a most obvious swing to the air-actuated friction clutch for operation of all types of heavy stop-motion machines, such as forging machines and presses, and the displacement of magnetic clutches, toggle-operated friction clutches, and metal-to-metal block, jaw and pin type clutches.

O. W. McMullan, metallurgist, Timken-Detroit Axle Co., Detroit, believes that controlled furnace atmospheres in general are due for a great increase. It is his opinion, however, that they will be adopted last by plants engaged in forging and rolling where steel is necessarily exposed to the air during these operations. Even here, however, elimination of hammered or rolled in scale would be an advantage. Many axle shafts retain the original bar size over most of their length and since the greatest fiber stresses are in the outer layers, elimination of decarburization will increase strength greatly.

Engineers of the Globar Corp., Niagara Falls, N. Y., express their faith in economic advantages of electric forging furnaces. Given favorable electric rates, they contend that the overall cost of heating by the electric method will be lower and the product superior, as compared with other methods of heating.

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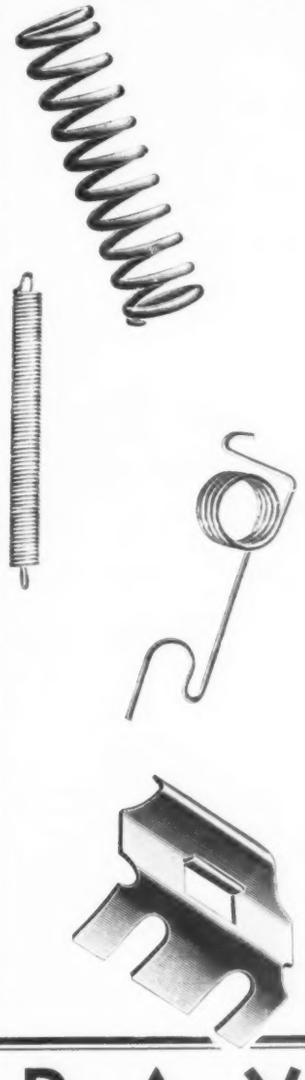

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Springs, Small Stampings, and Wire Forms.

RAYMOND
Quality Springs

Stampings Become More Complicated

(*Concluded from Page* 154)

reduce hardness of the stamping before proceeding to the next operation. Surface Combustion Corp. successfully met this condition with a specially designed full-muffle type, controlled-atmosphere furnace with a rated capacity of 2160 pounds of clean annealed steel stampings per hour.

Tendency among automobile manufacturers has been toward the use of wider and longer sheets for stamping purposes, says L. S. Marsh, manager, department of inspection and metallurgy, Inland Steel Co., Chicago.

Also, says Mr. Marsh, there seems to be a feeling among automobile body builders that the character of surface obtained on wide cold strip mills is more suitable, both for the press operations which the sheets have to stand and also for holding paint films.

Ability, because of the availability of wide sheets, to produce in one stamping, parts previously assembled from two or three stampings, also is commented on by Edward L. Wetstein, vice president, Great Lakes Steel Corp., Detroit. "We believe that by far the best quality in regard to surface and physical properties now is being produced for difficult stamping work," says Mr. Wetstein, "and with the aid of improvements in dies and much that we have learned metallurgically and about the heat treatment of steels, in our own plant, complicated stampings today can be made which we would have believed impossible 5 years ago.

Development of wide cold rolled sheet and strip mills also is regarded by George D. Blair Jr., president, Blair Strip Steel Co., Newcastle, Pa., as an outstanding advance; he points out that these wide sheets enable consumers to blank and stamp single sections, especially for automobile body parts, with a remarkable economy and improvement in product.

Mr. Blair also comments on the importance of the development in the manufacture of steel which makes it possible to obtain material with definitely controlled carbon. This feature has eliminated many of the former problems in connection with heat treating and carburizing.

An important step which facilitates production of soft sheets and strip used in modern forming operations, says George F. Comstock, metallurgist, Titanium Alloy Mfg. Co., Niagara Falls, N. Y., is the development of a new low-carbon, ferro-carbon-titanium. By its use, as a mild deoxidizer and scavenger to improve rimming of steel ingots, material for deep drawing stock may be given the titanium treatment without raising the carbon content of the steel appreciably.

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Welding Accepted In All Fields

(*Continued from Page* 157)

be known about initial or residual stresses in welding, how they may be minimized or relieved. Investigations here and abroad are beginning to produce quantitative data on this subject. Welding of the numerous alloy steels offers a more fruitful field for investigations.

Although he regards the welding of hydraulic parts for Boulder dam as the principal achievement in 1934, G. H. Moore, Jr., welding office, production department, Newport News Shipbuilding & Dry Dock Co., Newport News, Va., points to the tanker POUGHKEEPSIE SOCONY, the freighter MS Dolomite I, and new navy ships as outstanding examples of ship welding. A.C. welding has yet to be found suitable for general ship weld-

ing, he adds. Fireproofing of ships, concludes Mr. Moore, will favor welding processes.

Among numerous developments in arc welding in 1934, J. F. Lincoln, president, Lincoln Electric Co., Cleveland, mentions the use of high-frequency alternating current, mainly for Class 1 welding, and introduction of a number of electrodes for specific purposes, these having to do particularly with special alloys. The latter includes electrodes for applying hard cutting edges to tool bits and building up rail ends.

Glimpsing into the future, Mr. Lincoln contends industry will recognize that if welding is practical for difficult jobs, such as cracking stills, high-pressure steam boilers and high-pressure piping, it is also practical for fabricating tank cars, low-pressure boilers, and applications of a similar nature. It is difficult to realize that we use welding where service is severe and no other process is feasible, but fail to utilize it in simple applications. The tendency toward higher welding speed, both hand and machine, will reduce costs.

In 1934, much thought and research was devoted to welding with a view to improving materials, technique, tests, specifications and applications of the process. This is the opinion of F. Eder, Robert W. Hunt Co., New York. The recent rapid adoption of A.C. welding is due in great measure to the excellent results obtained with coated electrodes.

New Alloy Rods Remarkable

Principal progress of the past year, as reported by J. H. Deppeler, chief engineer and works manager, Metal & Thermit Corp., New York, was the development of electrodes depositing alloy steels exhibiting remarkable physical properties, as for instance, in the case of deposits containing small percentages of chromium, manganese and molybdenum, tensile strengths of 100,000 pounds per square inch, with elongations over 20 per cent in 2 inches.

Mr. Deppeler reports that continued progress was made in the interesting development of thermit welding of steam railroad track where experience over the coldest winter and the hottest summer weather in recent years indicated that with certain types of construction jointless track is practical. Expansion at the end of half-mile stretches of main line track has proved to be so little that ordinary bolted joints can be used at this location.

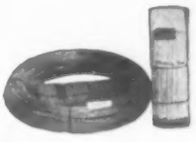
G. E. Doan, associate professor of metallurgical engineering, Lehigh university, Bethlehem, Pa., calls attention to the refinement of tests for qualifying arc welders so that their work may be checked up as to quality and uniformity more frequently and with less difficulty and expense. Tests of welded steel members have led to an increase of confidence in welding for steel construction. Fundamental research in the nature of the arc and in quality of steel most suitable for arc welding begins to show considerable promise. In general, the field of arc welding seems to have entered the stage of slower but more thorough scientific development.

Among the unusual resistance welding developments of 1934 is equipment built for the automobile industry for fabricating all-steel bodies. This equipment welds the back panel, side panels and cowl all at one time. So comments M. L. Eckman, formerly research engineer, Federal Machine & Welder Co., Warren, O., and now head of research and development, Thomson-Gibb Electric Welding Co., Lynn, Mass. Of recent development is a hydromatic welding unit whereby spot welds can be made at the rate of 50 in 10 seconds — multiple units increase the number in groups of 50.

Precise timing apparatus developed for resistance welding also is noteworthy. It is now possible, states Mr. Eckman, to time electric current in actual cycles, and in some cases within half cycles.

The past year has not been out-

WIRE



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standing in development of new technique in welding, but rather was given to demonstrating and perfecting existing methods, particularly the metallic arc, roll or continuous spot welding and the shot welding process. Development of homogeneous coatings of nonpoisonous nature have assisted the welder in perfecting the technique of existing methods more rapidly. These are observations made by engineers of the Allegheny Steel Co., Brackenridge, Pa. In their opinion, commercial applications of continuous spot welding will increase rapidly.

Shot welding of stainless steel is becoming increasingly popular in light-weight construction, such as airplanes. According to J. A. C. Yule, Fleetwings Inc., Bristol, Pa., it passed beyond the experimental stage a year or so ago. Chief progress at present is in the intricate designs which simplicity and rapidity of the process render possible.

The most important recent development, comments Mr. Yule, is in the manufacture of seam welded stainless steel gasoline tanks. Careful design has made it possible to seam weld all joints.

Development of the copper brazing process for joining steel parts and tube controls for spot welding machines have been of chief interest to the National Cash Register Co., Dayton, O., according to William Hartman, vice president in charge of engineering and production. The copper brazing process provides a rapid sure method for permanent assembly of parts, such as hubs, punch press parts, etc., into a unit assembly.

Closer co-operation between the metal producing and using industries and the oxyacetylene industry was responsible in no small measure for many important advances in gas welding and cutting during 1934, report engineers of the Linde Air Products Co., New York.

Introduction and acceptance of a new multiflame welding head for pipe line work indicate a definite trend toward more efficient utilization of the oxyacetylene flame.

The sudden increase during 1934 in adoption of surfacing operations by means of the oxyacetylene process is significant. Better wearing surfaces of special bronze are being applied to literally millions of parts, thus saving untold expenditures for replacement or other repairs.

Precision Flame Cutting Grows

Precision flame cutting of steel within tolerances comparable to those of machine tool cuts, but with an economy and flexibility previously impossible, and the feasibility by this method of cutting in different planes or at different levels and angles on the same work, all point to a gradual replacing of complicated tool machinery by oxyacetylene cutting equipment, contend Linde's engineers.

Welding is only one of several growing activities calling for the consumption of oxygen or oxygen and acetylene, comments F. E. Rogers, applied engineering department, Air Reduction Sales Co., New York. Among miscellaneous uses of interest to the metal industry are heat treating, heating for bending, metals coating, paint removal, and heat treating of rail ends. One of the minor outstanding developments is the broadening use of silver solders.

Development of speed welding technique, using a slightly carburizing flame, is responsible for growing efficiency of oxyacetylene welding as more welders learn to use this method. Co-ordinated with improved welding practice, observes Mr. Rogers, has been the development of superior welding rods and base metals of good weldability.

It is no secret that improved hardfacing materials are in development and trial use, but it is too early to give them general publicity. Eventually, Mr. Rogers predicts, hard facings and general use of ball and roller bearings will cut the national waste of wear one half. Billet gouging or flame machining in steel mills is becoming more widely recognized

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as its economic advantages are learned.

Improvement of the welding rod and the decided improvement of structural welding with the covered rod, are regarded as important by T. R Lawson, head, department of civil engineering, Rensselaer Polytechnic institute, Troy, N. Y. A problem not yet entirely solved is that of locked-up stresses due to welding. The high heat which accompanies welding is bound to create internal stress on cooling that is difficult to remove. No satisfactory method has as yet been found to take care of these stresses adequately in structural work.

Prof. C. A. Adams, Harvard engineering school, Harvard university, Cambridge, Mass., lists an important group of problems, upon a more rational solution of which the application of welding in certain important fields depends. This group covers the field of residual stresses and methods of stress relieving. A large amount of experimental research already has been conducted, but as yet none of the results has been so coordinated with theory as to be safely applicable to new structures.

Education Is Prime Need

The greatest need of the welding industry is education of architects and engineers in the principles of welded design and preparation of suitable specifications so that welding will be used in new construction, safe designs prepared, and good workmanship can be assured by requiring the use of suitable welding processes, qualified operators, and continuous supervision during welding. This is the view of J. W. Owens, director, National Weld Testing Bureau, Pittsburgh. The most important development during the year, he says, was decision of the American Welding society to prepare a fundamental code for qualification tests for operators of fusion welding equipment.

The prize for engineering achievement in welding should go to the federal government, states J. M. Jardine, Western Welding & Boiler Repair Co., Chicago, for the various river dam projects and naval construction program. However, he adds, the design and utilization of welding in light-weight railroad equipment must not be overlooked. A problem still to be solved is how to determine a reliable weld.

A few years ago, use of welding was restricted due to lack of knowledge on the part of designing engineers as to proper application. Many failures of welded components and structures, states Major G. M. Barnes, ordnance department, war department, Aberdeen proving ground, Aberdeen, Md., have been caused not by weakness of welds, but by use of welds where they should not have been used, or failure to analyze properly the forces acting upon the welds. In the majority of cases, the strength of welding is ample.

Work with which L. C. Bibber, senior welding engineer, bureau of construction and repair, navy department, Washington, is connected cannot be disclosed as a matter of naval policy; however, progress has been made in matters less spectacular but probably more far reaching in effect. The problem of a practicable and equitable method of testing electrodes is considerably nearer a solution than a year ago.

The suitability of various kinds of steel for welding also is much better established; however, according to Mr. Bibber, one serious problem has arisen, namely, laminations in plates. This is a problem for the steel manufacturer rather than for the welding engineer.

It should be of utmost importance for the welding industry to have a nondestructive testing method which could be applied readily, would be economically reasonable and be absolutely reliable. While the A. S. M. E. boiler code contains such provisions for Class 1 welding, there are other classes of welding which ought to be examined just as carefully, in the opinion of H. R. Isenburger, St. John X-Ray Service Inc.,

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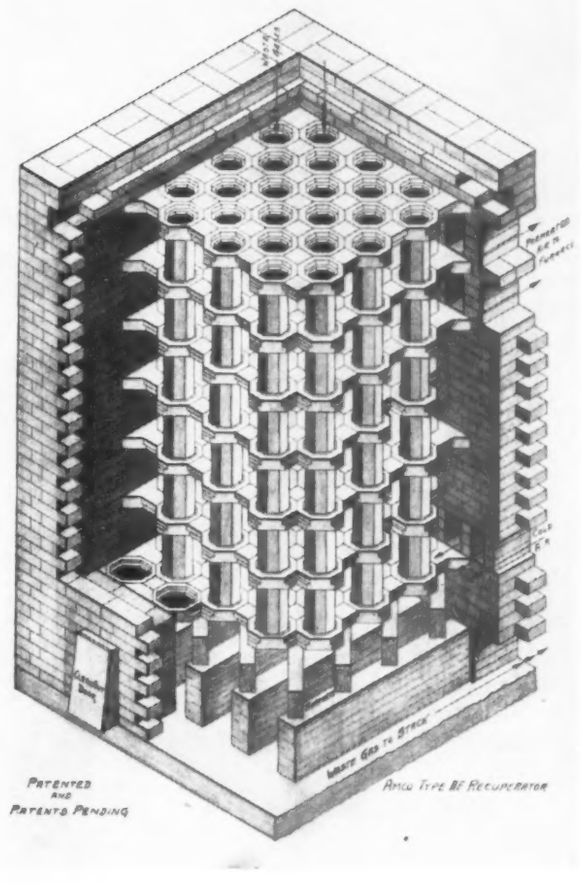

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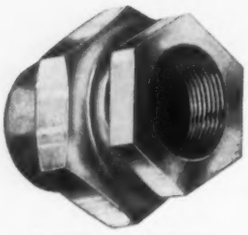

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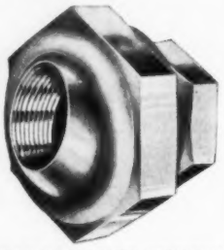

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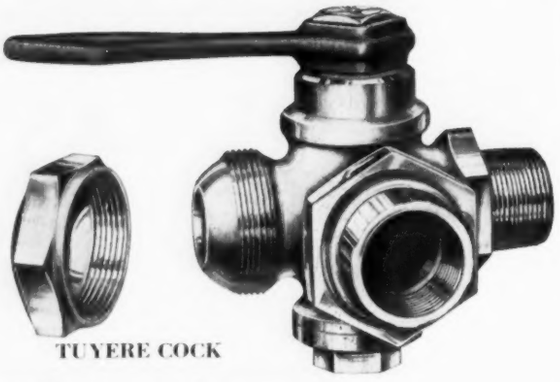

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Long Island City, N. Y. The thinner the plate stock, he says, the quicker a defect will develop and cause failure.

X-ray inspection, Mr. Isenburger maintains, is at present the only method which will show inside conditions of a weld without destruction. It is of great importance that this work be done with properly designed and installed apparatus, employing correct technique which will give good results in the most economical manner.

One of the oldest methods for the fabrication of structures is by riveting, a method so well established that its progress attracts little attention while newer processes are pushed with aggressiveness. Nevertheless, developments are occurring in rivet design and manufacture and riveting practice. During the past year, reports Pierre Champion, vice president, Cleveland, the A. S. T. M., the A. S. A., the navy department and rivet manufacturers have developed a new standard on rivets. This is incorporated in navy specifications No. 43-R-1D, dated Nov. 1, 1933.

Closer Tolerances Specified

The significant feature of this specification is a closer tolerance between the rivet and the hole. For the past three decades it has been standard practice to allow 1/16-inch clearance between rivet holes and rivets; the new specifications reduce the clearance to 1/32-inch. With closer tolerances, better workmanship in riveted joints must follow. The new specification also employs a unique method of determining the concentricity of the rivet head with the shank, and incorporates a new type of raised button head, commonly known as acorn or strawberry type of head.

Rivets and riveted joints may be improved further by adoption of centerless ground rivets with a plus or minus tolerance of 0.002-inch. This will permit still closer tolerances between the hole and rivet which will increase substantially the efficiency of joints.

Mr. Champion says that had boiler makers and rivet manufacturers recognized the value of better riveted construction and employed X-ray examinations of joints, possibly welding would not have assumed the proportions it has in the fabrication of pressure vessels.

Stainless steel riveting is not very prolific; most of the work has reverted to welding. The most notable piece of riveted construction in 1934, maintains Mr. Champion, was the towers for the Tri-borough bridge in New York, these being built-up sections of structural steel. The top and bottom face of each section was machined to a tolerance of 0.006-inch.

Properties of Castings Improved

(*Continued from Page* 159)

Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, who states that copper probably affects the physical properties of malleable iron, properly so-called as distinguished from the partially graphitized products, more than any other alloying element.

Dr. Schwartz notes that unsuccessful efforts have been made during the year to devise a descriptive name for those products which, while made by processes similar to those employed in the malleable foundry, purposely produce a metal containing significant amounts of combined carbon. He sees a considerable need for such a term.

Efforts of malleable foundries to meet the pressure of higher labor and material costs under NRA have been directed toward economies in manufacture. At the same time, improved accuracy, precision, and delineation of design in castings have required more accurate pattern equipment, flasks and ingenious dies for straightening castings in hydraulic presses, states J. H. Redhead, president, Lake City Malleable Co., Cleveland.

Pipe Cast on Metal Molds

"Probably the most important development of the year metallurgically in gray iron," declares James T. MacKenzie, metallurgist, American Cast Iron Pipe Co., Birmingham, Ala., "was the process for casting pipe on metal molds without producing chill, and also the discovery of the long-time low-temperature anneal for the strengthening of material so cast." This process (STEEL, Feb. 12) is described as blanketing a layer of gas between metal and mold, this gas being held by a powdered material such as ferrosilicon.

Increasing use of alloys, with numerous modifications and improvements in commercial types particularly in the chromium alloy grades, impresses W. J. Priestley, vice president, Electro Metallurgical Co., New York, as an important trend observable in 1934. Development of ferrochromium briquets has made it possible to produce economically in the cupola cast iron containing 15 per cent or more chromium, iron which will resist oxidation and growth up to a temperature of about 1500 degrees Fahr. A special grade of ferrochromium also has been developed, designed to facilitate ladle additions of chromium.

Mr. Priestley also notes a considerable increase during the year in the use of high-nitrogen ferrochromium for introducing nitrogen into high-

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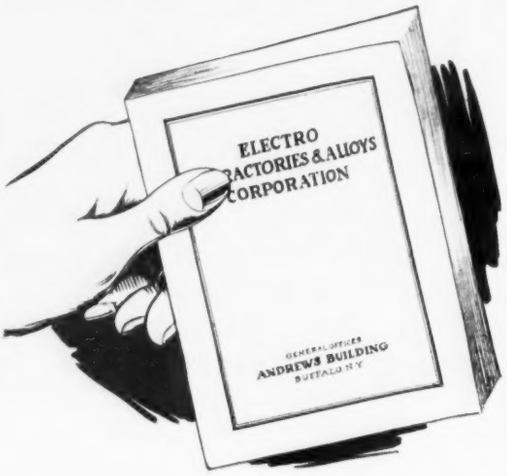

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chromium castings to refine grain with a marked increase in ultimate strength and yield point.

Cast steels containing 4-7 per cent chromium have found wide application in the petroleum industry and for incinerator and furnace parts. Addition of titanium to such steels increases the life and overcomes tendency of these steels to air harden when cooled rapidly, particularly if the carbon content is low.

Nickel cast iron has made rapid strides over the past year. Summing up the situation, J. S. Vanick, specialist in nickel cast iron, International Nickel Co. Inc., New York, points to the increasing specification of nickel, nickel-chromium, nickel-chromium-molybdenum and nickel-molybdenum cast iron.

He states: "Power equipment, engines, compressors, pumps and the like are being built not alone for greater stresses but to resist wear to an unprecedented degree. Truck, bus, tractor and diesel engines are making decisive strides in the battle against wear. Cylinder liners hardened to 450-500 brinell or 600 Vickers, previously considered impractical because unmachinable, are being machine finished to smooth, mirror-like surfaces. Capable of delivering up to 200,000 faster traveled miles before reconditioning as against 75,000 heavy-duty miles for the old style 230 brinell cylinder, these irons containing 2 to 3 per cent nickel with small amounts of either chromium or molybdenum, are pointing up the path which passenger car engine materials will have to travel."

Refinements in Details

In the opinion of R. S. MacPherran, chemist and metallurgist, Allis-Chalmers Mfg. Co., Milwaukee, the trend in the foundry industry has been toward greater attention to details, rather than any startling change in practice. Appreciation of the fact that cast iron can be changed greatly by heat treatment is becoming more widespread, he states.

Increase of interest in special purpose irons is commented upon by R. F. Harrington, metallurgist, Hunt-Spiller Mfg. Corp., Boston, who mentions a typical iron in this class, a heat and corrosion-resisting analysis with 14 per cent nickel, 6 per cent copper and 2 or 3 per cent chromium. Irons containing 25 to 35 per cent chromium, for heat and corrosion resistance, also fall in this class, as does the invar-type iron with 36 per cent nickel.

Recognition of the newer properties available in gray iron has been accentuated over the past year, according to Arthur J. Tuscany, executive secretary, Gray Iron Founders Society Inc., Cleveland, successor to the Gray Iron institute. Mr. Tuscany continues: "With the complete success of gray cast iron in service as

crankshafts and camshafts, there has been demonstrated the fact that graphite particles in metal structure are not the detriment that may have been imagined on some past occasions, but a real advantage when graphite content and distribution are properly controlled."

The gray iron foundry industry has made remarkable progress in organizing under its code during the year. Thirty chapters in various sections of the country are now functioning under the industry's code authority. The Gray Iron Founders' society is code authority administrative agency for the industry; its president, Franklin R. Hoadley, says: "Despite the opinion of the individual regarding the recovery act and the advantages or disadvantages under codes, I am satisfied that a lasting benefit has been derived from the necessity of organizing the various foundry industries under their respective codes."

A similar opinion is echoed by W. L. Seelbach, secretary and treasurer, Forest City Foundries Co., Cleveland, who prophesies: "For 1935 . . . if the administration at Washington will treat industry with a little respect and at the same time prevent the passage of laws penalizing American industry, business will progress successfully and the gray iron foundry industry will more than receive its share."

In the Nonferrous Foundries

Most nonferrous foundries have more or less been marking time during the past year, states N. K. B. Patch, secretary, Lumen Bearing Co., Buffalo. A few have developed some new molding practices and have adopted some new alloys or changed practices in a minor way. Considerable publicity has been given to the increasing use of beryllium-copper alloys, although in Mr. Patch's opinion the use of cast beryllium alloys is still in its embryonic stages.

A rather pessimistic view of the brass foundry industry is taken by H. M. St. John, chief metallurgist, Detroit Lubricator Co., Detroit, who states: "The brass foundry industry has continued to retrogress during 1934. To some slight extent there has been progress in metallurgical research, but even this has made but little impression on the industry.

"Electric melting has suffered from the well-known fact that it loses much of its economy during periods of irregular and intermittent operation. Inflexible demand charges for electric energy—with here and there a notable exception—have also been a deterrent factor. It is noteworthy, however, that foundries which had well-established and efficient electric furnace departments prior to the depression have, for the most part, continued to operate them.

"The keynote of the whole situa-

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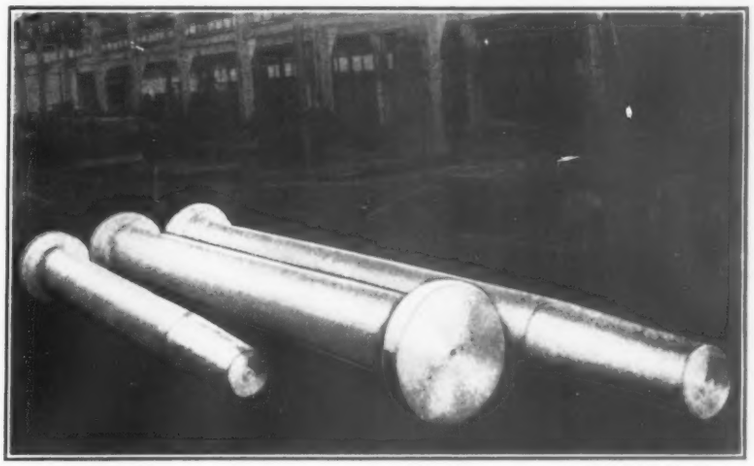

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tion is that, although sand-cast brass will continue to hold part of its position in industry, much of the field it once occupied will be taken over by other metal-forming processes. The brass foundry must adapt itself to these changing conditions and must concentrate its technical efforts in the direction so indicated."

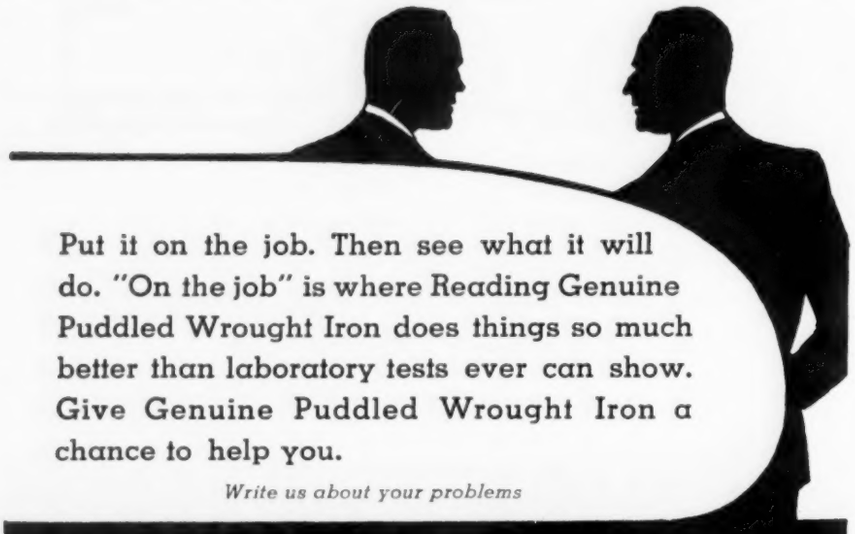
G. H. Clamer, president and general manager of the Ajax Metal Co., Philadelphia, points out that in the nonferrous founding industry a better understanding of costs has resulted from group meetings occasioned by the operation of NRA codes. In the production of nonferrous alloys in ingot form for foundries, a drastic reduction in the number of alloys now used is in prospect as a result of accumulated data. Further, research work at the national bureau of standards has resulted in a definite knowledge of the effect of impurities.

Both sand casting and permanent mold casting of aluminum have made progress over the past year. Clarification and correlation of various aluminum casting alloys for specific applications, together with introduction of new analyses, have expanded the scope of these materials. Similarly, magnesium alloy castings are being given more attention. There are about 20 typical aluminum casting alloys and half as many magnesium alloys.

To refine the grain size of aluminum castings, a new alloy has been made available and is used successfully for the popular aluminum foundry alloy containing 8 per cent copper. The new alloy, according to George F. Comstock, metallurgist, Titanium Alloy Mfg. Co., Niagara Falls, N. Y., is essentially a source of titanium in a readily soluble form; it contains 5 to 7 per cent titanium with low content of impurities. Addition of 2 or 3 pounds of this alloy per 100 pounds of aluminum gives finer grain in the castings and improved strength, ductility and soundness.

In the foundry equipment field, the best indication of progress was revealed by the hundreds of new and improved devices exhibited at the exposition held in conjunction with the American Foundrymen's association convention in Philadelphia.

Much has been accomplished during the past year in cleaning room equipment. S. C. Vessy, president of W. W. Sly Mfg. Co., Cleveland, points out that dust control must not be confused with dust collection and disposal. Dust control relates to the prevention of dust dissemination into adjacent atmospheres, whereas dust collection refers more particularly to the collection and disposal of the dust after it is brought into control. He is of the opinion that in the next two or three years great strides will be made in the matter of control of industrial dusts.



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Die Castings Are Finding New Uses

(*Continued from Page* 159)

witnessed the completion in development of a new modern line of machines which should revolutionize the art and increase its scope, he says. In reference to zinc base alloy die castings, Mr. Lester maintains it has been definitely established that fully hydraulic plunger-type machines are the most economical, productive and satisfactory in commercial use and assure maximum solidity, the finest surface conditions obtainable and minimum contamination of the metal.

Progress in size and application of castings, in alloy and in plating solutions is commented on by R. L. Davis, market development division, New Jersey Zinc Co., New York. As an example of the possibilities for die castings, Mr. Davis cites the new "General Electric workshop," a combination lathe, saw and sander for the home; more than 20 zinc alloy

die castings are used in this assembly. An unusual accomplishment, he says, is the die casting of long strips of shaped, automobile body molding as long as 64 inches. Two new solutions and slightly modified procedures by which plated coatings of adequate thickness can be applied much more rapidly than previously possible are alluded to by Mr. Davis as among the year's outstanding developments.

Probably the most important development in aluminum base die casting alloys during the past year was the introduction of the well known 12 per cent silicon alloy, A.S.T.M. B-85-33T Alloy V; S.A.E. No. 305, says E. H. Dix Jr., chief metallurgist, aluminum research laboratories, Aluminum Co. of America, New Kensington, Pa. Investigations of a number of alloys showed that an alloy of greatly superior corrosion resistance could be obtained by controlling, within commercial limits, certain impurities normally occurring in the 12 per cent silicon alloy. This investigation, fortunately for the die caster, showed that iron is not one of the elements requiring close control, inasmuch as a maximum of 3 per cent iron had no deleterious effect on the corrosion resistance. Iron, however, does lower the ductility and hence in this new alloy the iron is controlled, although not within as close limits as some of the other elements.

Die Design Advancing

There is a marked trend toward the design of larger and more complicated die castings, says Alfred C. Rantsch, vice president and plant manager, Pressure Castings Inc., Cleveland, with resulting radical changes in die design. Incorporation of sectional and curved cores and loose pieces, with mechanical provision for removing these from the castings, have challenged the ingenuity of the die casting engineer. There is an increasing use of inserts of other materials which sometimes are complicated in shape and must be so anchored in the die that they not only are picked up readily in the casting but readily may be ejected. Problems of area, weight, gating and the capacity of the casting machine for delivering molten metal under sufficient pressure to the most distant points in the dies without becoming chilled are becoming more exacting.

Development of high pressure, full hydraulically operated casting machines, Mr. Rantsch concludes, materially has assisted in making it possible to produce castings free of porosity and other objectionable features. Another advantage with the new equipment is that it forces the metal into the die at a much lower temperature.

Surface Broaching Is Outstanding

(*Continued from Page* 163)

chine tools naturally follow and sometimes anticipate the needs of the machinery industry, says George H. Benzon Jr., vice president, William Sellers & Co. Inc., Philadelphia. During the past five years many skilled mechanics have separated from the industry; a great many more mechanics five years older have suffered unsteady employment and have lost their skill. In this period the volume of employment in the machining industry has been so small as to make it difficult, if not impossible, for concerns to maintain apprenticeship systems and other forms of training by which skilled labor has been produced in the past. Limits placed on working hours will, if continued, accentuate the foregoing, he declares. These factors have and will continue for the next five years at least, to determine lines of development.

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tions, machine tools are being designed to produce more accurate work with less skilled labor.

Refinements in control include multiple motors on machine tools and a number of recent designs show the use of several motors where one was used previously, thereby eliminating many mechanical parts and offering possibilities of control difficult if not impractical to obtain in any other way. Hydraulic controls also are gaining favor in many instances, he said.

Motors in addition to being employed in increasing numbers are being built into the machine tool. In some cases, Mr. Benzon declares, they are losing their identity as motors, becoming a part of the tools and in some cases are not even in evidence.

In the estimation of F. H. Morehead, vice president in charge of engineering, Walworth Co. Inc., New York, one of the recent important developments is the advancement made in precision grinding equipment. Specifically, it is the successful application of automatic precision gages and improvements made in construction of bearings, as well as the rearrangement of machine controls. All of these have not only greatly increased the attainable precision but also have advanced the possible rate of production.

Sales of machine tools in 1935 may be double those in the past year, C. S. Stilwell, sales manager, Warner & Swasey Co., Cleveland, advises STEEL. While he adds that this may seem highly optimistic, it is by no means impossible. His company for instance during 1934 showed an increase over 1933 of 150 per cent, and a similar gain in 1935 does not seem improbable, he advises. Prospects for machine tool sales in many respects, are much better than they were a year ago.

Comment coming from a large builder of machine tools contains interesting observations dealing with the economic and mechanical phases of the industry. It follows:

"Modern machines certainly must consider carefully the new metallurgy, for, with better materials and greater strength, many mechanical devices are taking advantage of higher speeds and smaller units. Hydraulic applications are broader in extent, not only furnishing pressure for tool feeds, but also are used more in instances of machine control, shock absorption and even as interconnection between operating parts.

Machine Drives Improved

"There also has been further refinement in electrical drives, not only in the direct and auxiliary type with their necessary interlocking and safety features, but also in combined electrical, mechanical and hydraulic features all in the same machine.

"Outstanding advancement has been made in broaching of several different types of surfaces, not only longitudinal, but circular, external and internal. Various developments in tools for finishing some of the new alloy materials present additional possibilities. In fact the entire machine tool field has, at almost every point, something new to offer." Hydraulic selective control in gear shifting which is included in a vertical turret lathe is typical of outstanding design progress.

Another company contributing to STEEL's survey sees cutting alloys and high-speed steel as two of the important developments because of their future possibilities as well as present value to both the machine tool buyer and manufacturer. "Discovery, not long ago, of such alloys as tungsten carbide and tantalum carbide has had a salutary effect on the metalworking industry. Machine design undoubtedly was affected by the introduction of cutting tools of these alloys. Many features such as high ranges of feeds and speed, proportions that insure strength, rigidity and accuracy, better provision for mounting and holding cutters, the

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arrangement of controls for more efficient operation—were originated or developed largely because they were absolutely necessary to the successful use of tungsten carbide and similar cutters. Many of these features, it has been found, can be utilized advantageously by users of high-speed steel.

"Reduction of nonproductive time is another important aspect of development. New methods of machining and the shortening of cutting time made possible by the use of tools and machines introduced during the past few years, have emphasized the necessity for strength and rigidity in machine tools. They also have revealed a need for means to reduce the idle machine time between cuts. In too many instances the requisite strength and rigidity have been obtained by simply increasing weight, which is apt to result in unwieldiness that defeats the reduction of nonproductive time. It is our opinion that the future will witness increasing demands for equipment that combines strength with lightness, that insures accuracy and permanence of alignments through scientific distribution of metal and carefully considered proportions, rather than through sheer size and weight."

Units for Multi-Purpose Work

A large machinery builder declares that "in general the machine tool industry now has a great deal more business than for the past two years. Designs have been brought up-to-date so that most of the units manufactured can be employed in a variety of combinations, not only to vary the purpose for which a single tool can be used from time to time, but so one common unit can be utilized in manufacturing a number of different types of machines.

"Marked improvement characterizes the development of various lubricating and hydraulic oils as well as cutting compounds and coolants. Greater attention is being given, particularly in the precision grinding machine, to absolute elimination of vibration in revolving as well as stationary parts.

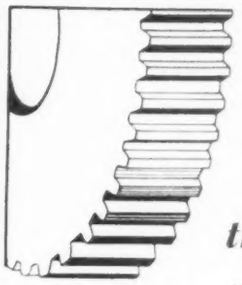
"Production is controlled not only by designing machines so they require less attention, but making them automatic in their cycles so that the operator has a definite interval in which to perform his operations. This obviates any hold-up in the production line. In addition to building machines that are more self-contained and require less attention, appearance has been given considerable study. The machine tools today probably represent the finest appearance of any machinery on the market."

An executive in the automobile industry, who prefers to remain anonymous, feels that it is quite generally agreed that all machine tools in the future should be motor driven which has been proved without much doubt to make the machine tool more practical and much less expensive from a power consumption standpoint than the old belt driven type machine.

"Hydraulic feeds for all types of machines will unquestionably be developed further but there seems to be a need for improvement in the type of pumps that have been thus far developed. The present types are rather sensitive and susceptible to annoying troubles and rather high in maintenance costs."

It seems to him that external broaching has a large field of usefulness which justifies considerably more development and progress, and that it will probably replace milling to quite an extent in the future. It is particularly adapted to small parts of irregular design such as were formerly and still are in many cases handled by form milling. The continuous type of broaching seems at this time to have good potential possibilities, this manufacturer contends.

From the Carboloy Co. Inc., Detroit, comes word that the year 1934 has seen more pronounced improvements in the cemented carbide field than during any other year in its brief history. Various grades of the material have been developed to fill a wide range of requirements. One of the most significant trends, according to a



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representative of the company, is the more extensive use of single purpose production machines designed for exclusive use with cemented carbide tools. When a new cutting material is introduced it usually is tried out on single point tool applications and as it proves its economical possibilities, the material is applied to operations requiring more complicated tool set-ups. In view of this it is interesting to note, the survey says, that during 1934 there has been a decided increase in the number of multiple tool heads, adjustable cutters, etc., ordered for operations combining boring, reaming, facing, champing, until today such multiple tools represent a substantial percentage of the Carboloy output.

John H. Baninger, assistant chief engineer, New Departure Mfg. Co., Bristol, Conn., calls attention to flange-type precision bearings which have been developed during the past year tor machine tool main spindle mountings. Single and double-row sealed bearings also come into this category of new machine parts. He points particularly to the simplicity of construction. Length of the housing is reduced and both bearing seats can be machined accurately in the same set-up, thereby obtaining perfect alignment.

A representative of the Heald Machine Co., Worcester, Mass., stresses the importance of improved appearance, built-in electrical controls and the hydraulic system in referring to a precision boring machine recently developed by the company. The main control unit is built up of separate units for various functions, all mounted on three flat plates with drilled and cored depressions which in mating provide the necessary channels for oil used in the hydraulic circuit.

The past year's development record of the Cincinnati Milling Machine Co., Cincinnati, is impressive and reveals that speed and feed ranges have been increased. Advanced control features are embodied in its new milling equipment. The hydraulic system is becoming increasingly popular as indicated by its use in the company's new line of broaching machines. In milling machine attachments probably the most unique development was the wide range divider giving divisions from 2 to 400,000 without the use of change gears or more index plates.

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Lighter Weight Is Refractory Trend

(*Continued from Page* 164)

mentioned previously, have been used to line boiler furnaces of naval vessels in order that the weight saved in the boilers might be applied to armaments, states J. E. Brinckerhoff, sales manager, refractories department, Babcock & Wilcox Co., New York. In addition to other marine uses, these brick have been used in bell-type electric annealing furnaces and other types with removable roofs where the use of light-weight brick in the lining resulted in lighter steel frames and casings, and consequently required less power and a smaller crane capacity for lifting them. Advantages of this combination firebrick and insulator from the standpoint of fuel saving are important, especially on intermittently-fired furnaces.

Savings from Insulated Firebrick

M. J. Terman, also of the refractories department of Babcock & Wilcox, points out that increasing demands for lower manufacturing costs have led to broadening applications of insulating firebrick in steel heating furnaces. Time saved in heating up alone may run as high as 85 per cent on some furnaces.

In the opinion of J. C. Woodson, industrial motor engineering department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., the lightweight semirefractory brick represent the greatest and most important step that the refractory brick interests have made in a number of years. He also notes that several

companies have devoted considerable time and money to developing patching cements for boiler settings, open-hearth furnaces and electric steel melting furnaces, at least three companies having developed such a cement that is economical and practical to use, rather than to reline the furnace every time the walls begin to spall down.

Semirefractory insulating brick have found widespread application, according to S. M. Jenkins, insulating division, Armstrong Cork Products Co., Lancaster, Pa. Advantages which he sets forth include: Operating conditions are attained in a minimum of time. The furnace is easy to halt and hold at a given temperature such as is required in annealing furnaces for such ware as large rolling mill rolls, etc. The brick also are adaptable for enameling furnaces operating on cast iron or steel. The new semirefractory material helps to speed up furnaces in production lines and has been instrumental in changing many continuous furnaces into the more or less periodic type, owing to the ease of operating such equipment for daily working conditions.

Continuing, Mr. Jenkins says: "With the advent of the semirefractory insulating brick, furnace walls now are built of 9 inches of semirefractory insulating brick or 4½ inches of semirefractory and 4½ inches of low-temperature insulating brick, both of which can be tied or bonded together. The thinnest wall is now one of 4½ inches of semirefractory and a monolithic insulating cement fill of 1 to 3 inches. This construction requires a steel shell and steel anchorage of the insulating brick to the shell. The semirefractory insulating brick are anchored by means of steel angle clips."

Insulation Pays Dividends

That the use of insulation has proved to be a paying proposition from the standpoint of fuel saving and longer life of refractories is the contention of Jay J. Seaver, vice president in charge of sales, H. A. Brassert & Co., Chicago. He cites the use of thicker insulation on open hearths, with savings of 4½ to 7½ cents per ton.

He also mentions the development of chemically bonded silica brick which withstand higher temperatures than lime bonded brick and also have the characteristics of being of much longer life and practically spall-proof. A new refractory slab porcelain with glazed surfaces and pierced holes is another recent development. It is being used for straining water and is noncorrosive, heat and acid resisting, and can be cleaned easily.

Surveying the use of insulation on open-hearth furnaces, A. S. Nichols, vice president, Illinois Clay Products Co., Joliet, Ill., says that plastic-type materials used on walls are not usually used behind buckstays, and many operators are working with resilient, compactible brick, built into the wall behind the buckstays to absorb the stress of the expanding brickwork without transmitting the stress to the buckstays. This type of brick, being a good insulator, also serves to keep the buckstays cool.

Another development, mentioned by Mr. Nichols, involves the use of the same brick, which can be pierced, in connection with alloy steel ties which hold the brick against the clay brick checker chamber walls.

"Confidence of the open-hearth operator in furnace insulation today," says Mr. Nichols, "is perhaps best illustrated by the fact that one plant after several months of satisfactory and economical operation of completely insulated 250-ton furnaces is insulating a 400-ton furnace, the largest of its kind."

Conducts Own Research

Gilbert Soler, manager of research, Timken Steel & Tube Co., Canton, O., points out how his company determines the best refractory materials for use. In this work, the company conducts research in the utilization of present refractories and in the development of new special refrac-

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tories, in the effort to produce better quality steel at lower cost.

Mr. Soler explains: "Furnaces have been insulated, and insulating firebrick used where excessive temperatures are not obtained. We have operated one insulated open-hearth furnace during the past year and find a considerable saving in oil consumption, a slight reduction in operating time and a slight increase in refractory life.

"We have developed and are producing for our own use such plastic refractories as high-temperature cements (aluminum silicate base), chrome cements, silica cement, plastic ramming mixes, plastic chrome materials for reheat and forging furnace bottoms, and special basic bottoms for electric and open-hearth furnaces. Development of a new basic brick for steel melting furnaces and ladles is in progress and should be completed in 1935."

Users' Demands Spur Progress

"Manufacturers of refractories have been making serious efforts and with good success to improve the quality of their various products," says R. Kirkpatrick, assistant sales manager, Norton Co., Worcester, Mass. These efforts have been stimulated to a large degree by the demands of users for heat-resisting materials of ever-increasing refractoriness, for use at high temperatures. Manufacturers of refractories in the electric furnace product class, such as fused alumina, silicon carbide, fused magnesia, mullite, sillimanite, etc., working under the code of the refractories industry, special refractories division, have made progress in adopting certain classifications for silicon carbide refractory brick, states Mr. Kirkpatrick.

A recent development in the refractories industry has been the introduction of superfireclay brick, a material notable for its combination of low porosity, volume stability at high temperatures, and high resistance to thermal changes. L. C. Hewitt, director of research, Laclede-Christy Clay Products Co., St. Louis, points out that this product is finding extended use in roof construction of various types of heating furnaces, as well as electric steel melting furnaces. Practically complete linings of this material are being made in electric arc furnaces producing special irons. A special type of superfireclay brick tapout block has been successful in the malleable iron field.

C. E. Bales, vice president, Ironton Fire Brick Co., Ironton, O., also comments on these superfireclay brick as an interesting development of 1934. He states further that much progress has been made in the development of suitable tests for refractories. Committee C-8 of the American Society for Testing Materials has adopted new and improved ing these new test methods. A new refractories manual will be issued by the A. S. T. M. early this year.

Denser Brick Produced

Use of the deairing process in refractories manufacture is commented upon by G. A. Bole, research professor, engineering experiment station, Ohio State university, Columbus, O., who declares that by this method denser and better-performing materials are being produced. Prof. Bole also notes increasing interest being shown during the year in olivine refractories.

To meet the demand for a superrefractory which could be substituted more widely for silica brick above the slag line in open-hearth furnaces, a new chrome refractory has been introduced, made by a process which utilizes accurate grain sizing, hydraulic pressing and an all-temperature bond which eliminates the necessity for firing the brick. Describing this new material, R. P. Heuer, director of research, General Refractories Co., Philadelphia, states that these unburned brick have approximately 30 per cent lower thermal conductivity than similar burned refractories. Furthermore, due to the high pressures used and the dense body developed by the pressing, bet-

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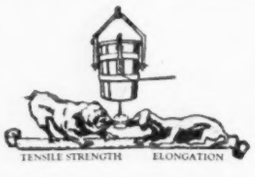

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F. H. Riddle, director of research, ceramic division, Champion Spark Plug Co., Detroit, remarks that it is "encouraging to note that many successful installations have been made with the insulating fireclay kaolin and mullite refractories, and that some manufacturers have developed such refractories for use at temperatures as high as 3000 degrees Fahr., pointing the way to substantial fuel savings."

Much Is Spent for Wide Strip Mills

(*Continued from Page* 168)

power-second at synchronous speed.

With the exception of the bearing pedestals, the machines are completely fabricated from steel plates and rolled steel shapes, by arc welding. The flywheel is of steel-plate construction. The magnet frame of the 7000-horsepower motor, is fabricated from four massive steel slabs each 25 feet 10 inches long, 26 inches wide, and 11 inches thick, weighing approximately 25,000 pounds. These slabs were received from the steel mill as flat slabs and were rolled into circular shape. Two slabs are welded together along a circumferential seam to form each half of the frame.

Last year three reversing hot-strip mills of the Steckel type were placed in operation in this country and Canada. In these mills, Mr. Winne points out, the main stand of rolls is of the reversing type, either 2-high or 4-high. Above the live tables, both in front and in back of the mill, there is mounted a fuel-fred furnace in which there is a rotating strip reel. A set of pinch rolls helps to feed the strip on and off from these reels.

In operation, a heated slab is rolled back and forth through the mill, operating as a straight slabbing mill, until it is reduced to such a thickness that it can be coiled on the reels. At this stage, the end of the strip as it comes from the mill is fed into one of the furnaces and on the reel. From this point on until the completion of the rolling, the strip passes back and forth through the mill from one reel to the other. The heated furnaces in which the reels are mounted serve to keep the thin strip hot during the entire time required for rolling, and thus permit producing a longer coil of thin strip than it would be feasible to roll on a straight reversing mill without the hot reels.

Considerable interest in cold-strip mills for the production of wide strip continues and several have been purchased during the year. The drives and control equipment for the Ford Motor Co's tandem cold-strip mill are designed to operate at a higher delivery speed than any existing mill rolling the same class of material, Mr. Winne advises. The mill is distinguished also by the fact that the main mill motors have a greater total capacity than those on any other cold strip mill so far built.

There are three roll stands in tandem, each driven by a 1500-horsepower, 350/700 revolutions per minute motor. The tension reel will be driven by a 400-horsepower, 300/1050 revolutions per minute direct-current motor. Control of the complete mill will be of the adjustable-potential type. With this system of control, the entire mill and reel may be threaded and the strip placed under tension at low speed, and then the entire mill may be brought quickly up to the running speed. The threading and running speeds are adjustable readily, and the entire control system is extremely flexible and responsive to the operator's wishes.

This mill will be provided with a special electric equipment for automatically measuring and regulating the tension in the steel strip between the roll stands.

An interesting combination of electric equipment used by one of the large steel mills to sort, according to thickness, sheets as they are cut from a coil of cold strip, is ex-

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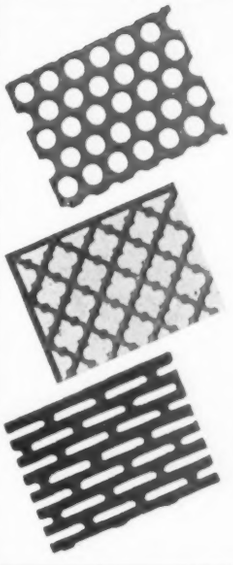

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plained by Mr. Winne. The strip as it comes from the coil is fed into a flying shear which cuts it into uniform lengths. Just previous to entering the flying shear, the strip passes between the rolls of a continuous electric gage. As long as this gage indicates that the strip passing between its rollers is within the commercial tolerance for thickness, the cut sheets are delivered over a roller-conveyor to the "stagger piler."

If any part of the coil of strip is thicker than the commercial limits, the indicating instrument connected to the electric gage closes one set of contacts which, through a thyratron relay, energizes a solenoid which in turn throws a switch on the roll table over which the sheets are delivered, causing the "thick" sheets to be delivered to another pile. On the other hand, if the gage indicates that the sheets being delivered are too thin, a second thyratron and solenoid combination operates to throw a second switch, delivering the "thin" sheets to a third pile.

Inspection Cost Reduced

The good sheets, in traveling to the piler, pass between a light source and a phototube connected to a "lot counting" relaying equipment which in turn controls a solenoid on the stagger piler. The lot counting equipment is adjustable so that the solenoid on the piler will operate after any number of sheets, from one up to ten, and this causes every group of, say ten sheets, to be offset slightly in the pile in relation to the groups immediately beneath and above it. This equipment, states Mr. Winne in conclusion, greatly reduces inspection cost and facilitates handling of the stacks of sheared sheets.

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Steelworks Study Operation Factors

(*Continued from Page* 172)

hearth department is called upon to make from day to day would militate against the flexibility of such a scheme. Many thousands of tons of steel will be made in the conventional manner before any plant management will take the risk of spending large sums of money needed to try out such an idea in its entirety. It may be that, as time goes on, certain phases of this plan will be tried out and developed on a commercial basis.

During the year, additional plants have installed automatic reversing mechanism on their furnaces. M. J. Bradley, Leeds & Northrup Co., Philadelphia, has estimated that each second saved in reversing a furnace is worth $700 per year. Operators in various other plants are studying control of the furnace by means of furnace pressure control where the furnace pressure automatically is controlled by regulating the stack damper. So far, the use of such equipment has given good results in certain plants. Other plants have gone a step further and have installed combustion control whereby a metered fuel-air ratio insures that the correct volume of air is supplied for the amount of fuel burned. Some superintendents have reported good results from the installation of this control.

Results Lack Unformity

Others have found that combustion control saves fuel but slows up the melting rate of the furnace. Here again, it is difficult to interpret the results of one plant and compare them with those of another, unless all conditions are known. Mr. Reinartz believes that, as time goes on, the kinks will be worked out and most furnaces operated automatically.

Two factors most intimately associated with open-hearth practice that have shown unusual advancement during the past year, in the opinion of W. J. Reagan, Edgewater Steel Co., Oakmont, Pa., are furnace insulation and iron oxide control. Two other items that are associated with all types of steelmaking are the de-

velopment of a new high-temperature thermocouple for use in temperatures up to 3600 degrees Fahr., and the wide interest shown in grain size control in various steelmaking processes.

Furnace insulation, he declares, while not showing the savings that many anticipated is undoubtedly here to stay. It already has changed some old ideas regarding the impossibility of insulating an open-hearth furnace and no doubt will have a tremendous effect upon the development of new refractories that are demanded as furnace insulation becomes more efficient.

An item that returns most material dividends for the time and effort expended, states Mr. Reagan, is the use of iron oxide control. Here again some old ideas have given way to scientific control methods and the savings to the furnace operator are extremely interesting. It is difficult to find an open-hearth operator who is not using iron oxide control to some extent. Making better steel at a lower cost is the ambition of most steelmakers and the use of iron oxide control is the means to this end. The present problem is to improve on the methods now in use, and which, as a rule, depend upon an addition of iron oxide to the slag to increase the iron oxide to the desired point, and on the development of a method to satisfactorily reduce the iron oxide in the slag, once it has reached a figure higher than desired.

High Temperature Thermocouple

The high temperature thermocouple made of carbon-silicon carbide and developed by Dr. Fitterer fills a definite need for a temperature measuring device for use in the open hearth. Its progress, says Mr. Reagan, has been definite and it now is being used in an open hearth, steel and iron foundries and the blast furnace. Accurate temperature determinations in the open hearth should solve many problems that now are unsolved. New ideas of ingot solidification can be visioned as the possibilities of use of such a temperature measuring device are considered.

Grain size control in the open hearth is still an extremely interesting and little known subject. Many theories have been advanced regarding the mechanism of controlling grain size, but to date all are theories. No doubt, Mr. Reagan concludes, this field will be most interesting and will be thoroughly investigated during the next few years.

Superior operating executives of most plants in the past year or two, comments W. C. Buell, Jr., engineer, Cleveland, have been forced by economic conditions to take an active interest in open-hearth affairs. The problem of economy is being correlated to include all factors of operation and not a single item here and there, as formerly was the case.

The open-hearth superintendent, he continues, generally recognizes that his furnaces built in 1900, 1920 or 1925 (and since usually enlarged as to bath capacity) are not on a par with the several groups built since 1929, but he deludes himself when, as is often the case, he harbors the idea that in plastering some insulation on the furnace or adding some nice shining instruments he is going to convert his old furnaces into 1935 models. Such thoughts and actions likely are responsible for the fallacies and prejudices of the older practice which followed unprogressive lines.

The higher executive likely will begin his schedule of betterment in eliminating the fundamental faults of the furnaces and thus better the rebuilding, repair and fuel costs. Until he has secured the greatest possible betterment in this direction he will not authorize the extraneous improvements that while perhaps benefiting operation to some degree under any conditions, will not react to greatest advantage until the furnace fundamentally is correct to assimilate such an improvement.

Insulating materials and their application to open-hearth furnaces

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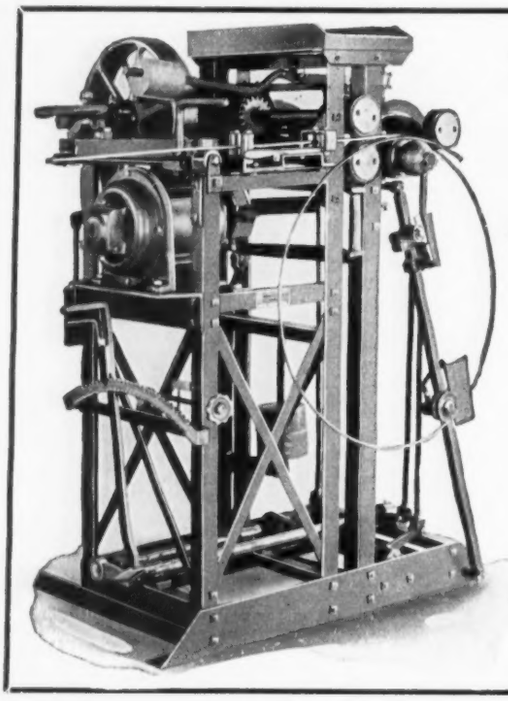
have made real progress in 1934, Mr. Buell maintains. No longer is the open-hearth superintendent charmed by the salesman who promises great economy in operation if only his material is spread all over the furnace, and in this the real progress has been made. Nearly every open-hearth operator has been disappointed by the empirical application of insulation, and having learned his lesson is now proceeding with the insulation of his furnaces sanely, and only after he has learned more fully of the properties of a material and its correct use.

Mold stools designed with a copper insert were placed on the market early last year. The mold rests directly on the copper insert and a clearance is provided between the top of the insert and the top of the stool. This makes an effective sealing joint and prevents the formation of fins on the ingot bottom. A detailed description of this type of stool was presented in the July 9 issue of STEEL.

Heating ingots at slightly high temperatures without washing them is accomplished by a nonreversing soaking pit developed during the year just closed. The pit is fired through a port located in the center of the hearth. Ingots are arranged on the usual bottom to surround the port and to avoid direct impingement of the flame on the steel. Waste gas outlets are arranged on each side near the bottom of the pit to circulate the waste gases entirely around the ingots, and to regulate the amount of heat carried to the respective sides to establish and maintain a uniform thermal environment longitudinally and laterally of the hearth. Recuperators on opposite sides are arranged to balance radiation losses and to collect the waste gases correctly from the plurality of spaced outlets, whereby proper heating may be controlled. The new pit is claimed to cost 20 per cent less than the conventional type, to consume 30 per cent less fuel and reduce the scale loss 50 per cent.



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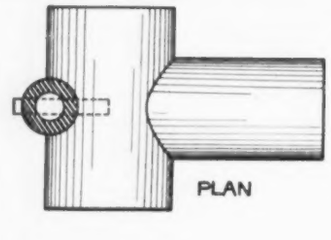

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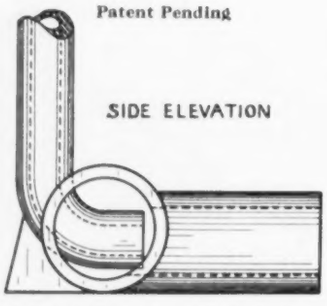

Economy and more Uniform Heating for Pickling Baths-

is obtained by this new steam injector. The new fitting comprises a heavy walled T-shaped body of lead which lies flat and firmly on the bottom of the tank—see sketch.

In operation the acid is drawn in opposite directions through the openings at the ends of the cross-branch, is heated by the central steam jet and returned to the body of the bath.

Longer life on the walls of tank and injector is secured as the heat and acid are evenly distributed. Hammering or chattering is largely eliminated and breakage of the injector (lead) is minimized.

Details gladly furnished.

DIETZEL LEAD BURNING COMPANY
Keystone Bldg. Pittsburgh, Pa.

Gas Distribution In Blast Furnaces

(*Continued from Page* 174)

grade hematite ore so that it may be concentrated magnetically. He cites this as probably the outstanding commercial development in beneficiation practices during 1934.

For the maintenance of fuel economy, the greatest activity continues to be in reconstructing stoves to secure higher blast temperatures. This movement has been stimulated by further demonstration of the ability of the electric precipitator to provide clean gas at comparatively low cost. Precipitators were installed at two additional plants last year and contracts let for other units to be built this year.

The new self-contained double-disk quick opening gas valve introduced late in 1933, has had a cordial reception and its performance in several installations has justified the expectation that it would be the most satisfactory solution to date of one of the most difficult problems in gas distribution.

America's Supremacy Challenged

America's supremacy in the production of pig iron is being challenged seriously for the first time by foreign producers who have been building new plants in accordance with American designs. Some of them have a considerable advantage in richer ores and cheaper labor. Maintenance of our position, Mr. Haven contends, should not be too difficult if our producers only will realize the value of many recent improvements in design, equipment and practice, and utilize them to a greater extent. The greatest detriment to progress at present, he concludes, has been unwillingness to invest new capital even when the ability of the device or method to

reduce costs has been demonstrated beyond question.

Among the new auxiliary equipment introduced last year was a new static gas washer of the multizone type for cleaning blast furnace gas to be used in stoves with 3-inch or larger checker openings and in boiler plants. A unit rated at 80,000 cubic feet a minute of gas at standard conditions uses less than 18 gallons of water per 1000 cubic feet of gas cleaned. A description of this type washer was presented in the April 2 issue of STEEL.

Introduces New Tuyere

Research and trials resulted in the introduction of an improved tuyere which is built with a refractory nose to withstand all furnace operating conditions. The improved refractory is chemically neutral to blast furnace slag and contains no reducible metallic oxides. It resists the materials and conditions in the regions of the hearth and bosh, and remains in place to function as a protection to the metallic tuyere.

A backwashing feature is embodied in a twin-basket water strainer which was developed last year for general blast furnace service and for removing slag from discharge water. The self-cleaning strainer may be mounted in any position.

Realizing the savings effected by insulating hot blast stoves, one blast furnace superintendent who installed checkers and graduated inserts in an old stove shell, developed a new method for insulating stoves. This was accomplished, explains J. J. Seaver, vice president in charge of sales, H. A. Brassert & Co., Chicago, by drilling four 2-inch holes through the brick shell around the inside periphery at each brick scaffold and blowing insulating material in between the old brick wall and steel shell, under pressure. Tests on this stove, Mr. Seaver points out, have proved the method to be practical as well as effective.

Affords Brick of Low Porosity

Progress in fireclay refractories has involved process as well as composition, according to F. A. Harvey, director of research, Harbison-Walker Refractories Co., Pittsburgh. The development of greatest interest is vacuum pressing as applied to the power press process. It has been shown, he declares, that the evacuation of the mold box prior to and during pressing permits the production of brick of lower porosity. Such brick, he points out, are attractive for checkers in blast furnace stoves since they have the greatest heat storage capacity and greater resistance to slag penetration. Another field for this type refractory is that of blast furnace linings.

The entire subject of checker brick in all phases has been given an immense amount of study during the year, states a refractory maker. Probably no single question has engrossed as much laboratory or engineering time. In the case of stove brick, the question of proper fabrication has at least been related with some degree of understanding to the practical problem in the stove.

After a service run of several months, a new type open joint checker brick for blast furnace stoves was introduced during the year just closed. Each checker is interlocked with adjoining checkers at all four corners, states William M. Bailey, president, William M. Bailey Co., Pittsburgh, and each course of checkers is locked into the adjoining courses, thus preventing shifting or twisting and the obstruction of the vertical flues.

The open joints not only interconnect all the flues, he points out, but present 92 per cent of the side surfaces of the checker to the action of the gases, thus affording a checker having an exceptionally large exposed surface. The open joints also equalize the flow of gas through the checker chamber, eliminating the possibility of secondary combustion in the bottom of the stove and making it impossible for the flow in any of the flues to be stopped for more than one checker length, in case a flue becomes clogged at any one point.

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BENDING ROLL—10' 2" Beloit Pyramid Type, arranged for motor drive. Top roll 8 1/2" dia. Bottom rolls 7" dia. Drop end housing. Capacity 1/4" plate.

BENDING ROLL—20' 4" Niles Pyramid Type. Top roll 20" dia. Bottom rolls 12" dia. Capacity 5/8". Drop end housing. Motor drive.

CAR WHEEL BORER—52" Betts Vertical, geared and arranged for motor drive. Quick change gears.

FLANGER—McCabe Pneumatic, capacity any thickness boiler plate up to 3/4". Circular heads 48" dia.

HAMMER—No. 4-B Nazel, capacity 5" square stock. Arranged for motor drive. Wgt. 13,640 lbs.

PRESS—HYDRAULIC WHEEL—300 ton Chambersburg, 50" between parallel bars. 11' from end of ram to outer support. Vertical Triplex Hydraulic Pump. Motor drive.

PRESS—No. 6 1/2 Bliss Straight Side Double Crank with spring counterbalance. Motor drive. 54" between housings. 8" stroke.

PRESS—No. 57 1/2 Toledo Straight Side Single Crank Motor Drive. Distance between housings 28". Stroke 10".

PRESS—No. 60 1/4 Toledo Straight Side Single Crank arranged for motor drive. 50" between uprights. Stroke 18". Shut height 53 1/4".

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